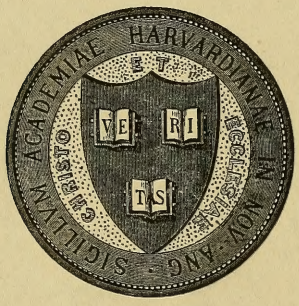
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THE CANADIAN FIELD-NATURALIST



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THE CANADIAN FIELD-NATURALIST, lately THE OTTAWA NATURALIST, established thirty-six years ago, "to publish the results of original research or investigation in all departments of natural history," is issued monthly, excepting for the months of June, July and August.

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Fig. 1

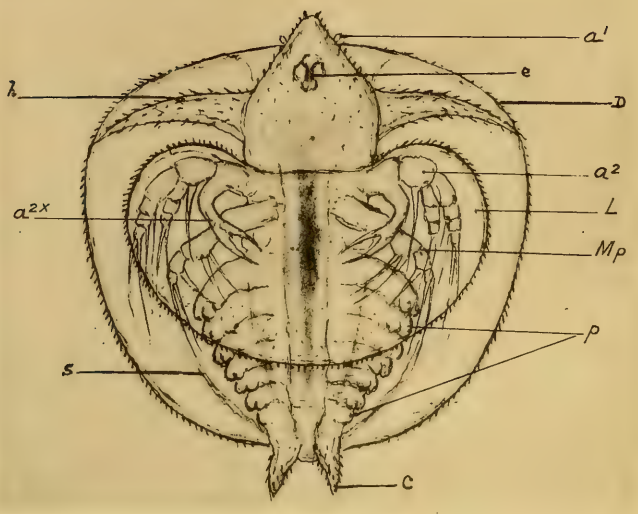
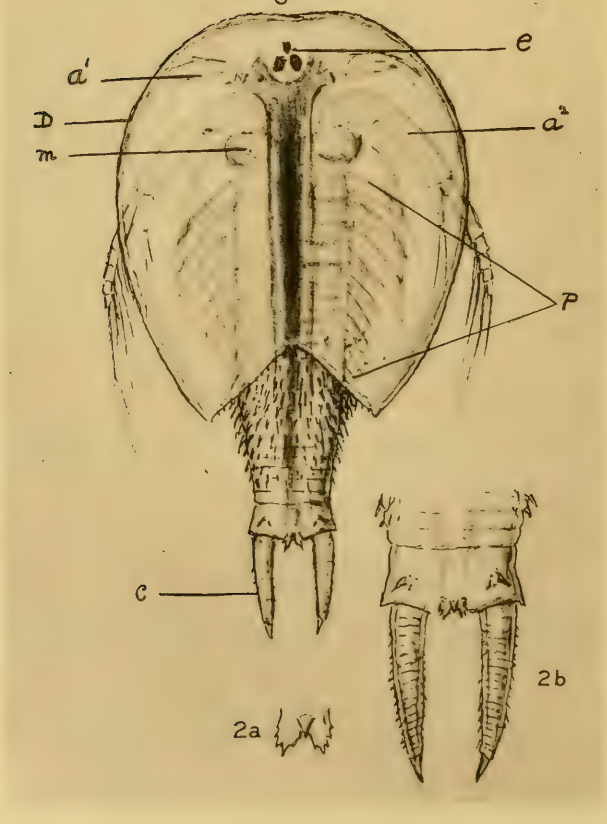


Fig. 2



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VOL. XXXVII OTTAWA, ONT., JANUARY, 1923 No. 1

ADDITIONAL NOTES ON EUPHYLLOPOD CRUSTACEANS

By FRITS JOHANSEN

Eubranchipus gelidus Hay

IN 1922 the species was first observed on April 13, when I went to the fields flooded by the Rideau River at Billings Bridge, Ont. (See *Canadian Field-Naturalist* for February, 1921, p. 28, and for May, 1921, p. 90). The river water was overflowing through depressions and ditches, vastly increasing the size of the pools on the pasture; the water in these was very muddy, and contained no Crustacea. In two pools which had now become isolated and where the mud had settled to the bottom were, however, a number of fairy shrimps from metanauplii (3 mm. long) to almost mature males (13 mm.). It will thus be seen, that the deposited (hibernating) eggs do not hatch simultaneously. The largest females had a length of only 10 mm. Water temperature in these 2 ponds at 5.30 p.m., 55°F. (Air 50°F.); sun had been out most of the day. Two days later I got a number of 5-10 mm. long specimens in a deep pool on the outskirts of Fairy Lake, Hull, P.Q., where they also occurred last year. Temperature of Air and Water 58°F. (5.30 p.m.)

These two records are the earliest I have of its occurrence around Ottawa; and remembering the 3-10 mm. long specimens collected by Dr. A. G. Huntsman at Toronto (see *Canadian Field-Naturalist*, for Feb., 1921, p. 28), on April 10, 1920, we may safely say, that the hatching of the hibernating eggs begins a week into April, in the vicinity of Ottawa.

On April 22 the fields at Billings' Bridge were visited again, and the fairy shrimps found in half a dozen of the now segregated pools. They now measured from 5 to 15 mm. in length, and the largest males had well developed claspers, and the largest females carried eggs in their pouch. The rose-purple colour of the underside of the tail from below the genital organs and the upper half of the cercopods, as also of the foliaceous legs was very conspicuous. They seemed to feed upon the larvae, only a few days old, of *Limnetis gouldii*.

Visiting the same place again on May 2, I noticed that some of the water holes now had dried up, and that in others, almost dry, the water was putrid, and the many fairy-shrimps present had not attained the size of those occurring in the adjoining pools. It will thus be seen that even fairy-shrimps have certain requirements as to food, space, etc., without which they do not thrive.

Twelve days later I noticed that specimens of both sexes were still common, swimming around in the wood-pools of Aylmer Park, P.Q., at a date representing their last appearance as observed the five preceding years.

And even on May 22 I ascertained, by wading around in the pool on the fields at Tenaga, P.Q., near the Gatineau River, that there were still a few specimens left. Except for a couple of younger (delayed) males all the specimens seen were full-grown females, 20 mm. long, with eggs; and they were keeping to the deeper parts of the pond and were more sluggish than earlier in the month. While *Limnetis gouldii* was present in millions, only two dozen *E. gelidus* were seen, while earlier in the season I have found them here in hundreds. This is the latest record for this fairy-shrimp around Ottawa so far.

Lepidurus couesii Pack.

I have recently received, through the University of Toronto, 3 large (25 to 30 mm. to end of telson) specimens of this species collected by Rev. Dr. A. I. Hunter and Mr. H. D. Cumming near Teulon, Man., west of Lake Winnipeg, about the last week in May and the first week in June, 1921. Dr. Hunter writes me that they ordinarily appear early, in creeks and ditches early in May, and attain full size about the first of June. These are the first definite specimens I have seen from Manitoba; though the species was known (see *Canadian Field-Naturalist* for March, 1921, p. 46) to occur there.

Lepidurus arcticus Pall.

(See *Canadian Field-Naturalist* for 1921, p. 47).

Fig. 2 to 2b. on the accompanying plate are figures kindly made for me by Prof. G. O. Sars, of Christiania University, of one of the two larvae (metanauplii) collected on June 23, 1875, on Novaja Zembla, Arctic Russia, and which I found on October, 1921, in the Riks-museum,

Stockholm (see Report C.A.E. 1913-18, Vol. VII, Part G., p. 5, Ottawa, 1922). The somewhat contracted specimen figured measures 1.42 mm. in length. For explanation of letters see the end of this article. The drawings were received from Prof. Sars after my C.A.E. report referred to had been published, for which reason they are reproduced here.

This figure of a 1½ mm. long *L. arcticus* larva is important, because it is only the fourth time so young a stage (1 to 2 mm. long) has been figured. A comparison of fig. 2a, b, with the figures given by Sars (1896), Brehm (1911), and Olofsson (1918), mentioned and reproduced in my C.A.E. Reports (Vol. III, Part K.; Vol. VII, Part G.) shows the variety in shape and armature of the beginning to the "caudal lamina"; namely, smooth or with two or three spines; a character still more complicated in the older stages. This "caudal lamina", marking as it does the anal opening, dorsally, consists in this larva (fig. 2) of a middle point, flanked by two a little larger, serrated points (fig. 2a). In the genus *Apus* the "caudal lamina" as well as the last abdominal segment (telson), upon which both it and the pair of long, jointed caudal filaments, or cercopods, are situated, retains this less developed state throughout life; but in the genus *Lepidurus* the "caudal lamina" grows out into a conspicuous triangular or spatulate plate, a real "lamella".

Limnetis gouldii Baird.

(See *Canadian Field-Naturalist* for May, 1921, p. 89-90).

When visiting the fields at Billings Bridge, Ont., on April 13, 1922, (see under *Eubranchipus gelidus*) I looked carefully for *L. gouldii*, but saw no trace of them. Nine days later I was at the same place again and determined to find them this time. The pools were now better distinguished than they were a week before, when the overflow of the Rideau River covered everything; and by examining the small pool where I secured the first *E. gelidus* of the year (see above), I succeeded in finding some very young *L. gouldii*. The method I used was to stand in my long rubber boots in the middle of the pool, which was about two feet deep, and jerk down a pipette or dropper in the water, close to the bottom or to the submerged vegetation (grass), many times, suck up some water, and hold it up against the light; and repeat this many times until a *Limnetis* larva, distinguished by its orange color, came up with the water. In this way I secured in the course of an hour or so six larvae, four of which were in the nauplius stage, and the two others a little older. They were distinguished from the many Ostracoda of the same size, also occurring in the pool, by their different colour and way of swimming.

The only record of *Limnetis* larvae found upon this continent published so far is a good figure of a 0.33 mm. big larva (seen from above) in Herrick and Turner: Synopsis of the Entomostraca of Minnesota (Geol. and Nat. Hist. Surv. Minn., 2nd Rep. State Zoolog., Series III, St. Paul, 1895, Plate XLVIII, fig. 1). Fig. 11 on the same plate is a ventral view of the distal end of a somewhat older larva of the same species. These two figures, as indeed the whole plate (illustrating Phyllopod larvae), are, however, not mentioned in the text, which is limited to an account of the Cladocera, Copepoda and Ostracoda; so that data about the place, etc., of collecting are not available. It is even posssible that the two larvae figured by Herrick and Turner belong to one of the 3 other *Limnetis* species occurring in the Middle West of the United States; but anyhow one of them is of particular interest, because it is so very young. This is shown by its minute size (0.33 mm.), also by the less development of the abdominal region and the lack of differentiated appendages (the later foliaceous legs) here, only four segments appearing as yet. A comparison of Herrick and Turner's figure (1) with the one of the youngest larva collected on April 22, 1922, at Billings Bridge, Ont., made by Prof. G. O. Sars of Christiania and reproduced here, also shows that what Herrick and Turner call "sensory filaments" are really the first pair of antennae; while their "first pair of antennae" are really the lateral cephalic horns.

The larva (nauplius) of *Limnetis* is so entirely different in appearance from the later stages, when it has assumed most of the adult characters, as to warrant special mention. The head is produced anteriorly in a blunt, triangular process, quite different from the later beak-shaped rostrum, bearing the tiny first pair of antennae laterally; and dorsally, in the middle, the large and single nauplius eye. Behind the head runs out on each side a long, curved horn, apparently an important factor in balancing the larva when swimming; while below (ventrally) the head runs out behind into a large, semicircular plate, representing the labrum, reaching half way down the abdomen. Otherwise the mouth parts are little developed; but the second pair of antennae and the mandibular palp are enormous and serve with their branches and long spine hairs as the principal swimming organs. After them follows the little-developed, pear-shaped abdomen, ending in two obtuse points, the later cercopods. The whole dorsal surface of the animal from the eye to the anal opening is covered by a large, flat, rounded shield reaching half way out over the swimming legs and supplied, as are the head and labrum-

plate, with a great number of short spines, both upon the edges and the broad surfaces. Of internal organs can be discerned the liver, budding out from the anterior part of the stomach, the intestine, and rudiments of genitalia. Contrary to the shape of the adults, the width of the larva is greater than its length, and instead of being compressed it is greatly depressed (flattened out), and there is as yet little trace of the double shell or carapace, later enveloping the body.

The discovery (hatching) of this peculiar nauplius was made on the 12th of May about eighty years ago at Dorpat in Livonia by A. E. Grube and described by him in *Archiv. f. Naturgesch.* 19 Jahrg. Bd. I, in his detailed account of the Conchostraca (Plates V-VII). He states that the youngest stage he observed was $\frac{1}{5}$ line, thus practically of the same age as Herrick and Turner's larva (fig. 1), though there are not yet any signs of segmentation of the abdomen. Grube states that already these tiny nauplii were very active in their digestion of food particles coming into the alimentary tract with the surrounding water, owing to the well developed muscles. Their mode of swimming is also very lively; with the double flat shell, the protruding locomotory legs, and the facility with which it turns around and swims with the dorsal as well as the ventral side uppermost, it reminds one of a tiny turtle. Owing to the larger size of the dorsal shield and the lateral cephalic horns, the swimming is, however, generally with the labrum downwards.

The possession of this large, flat, temporary dorsal shield with the *Limnetis* nauplius is an unique feature among Phyllopod larvae, and reminds one strongly of the nauplii of certain marine Entomostraca, the Cirripedia (barnacles, etc.). In the case of the Cirriped nauplius the purpose of the extensive "shield" is apparently to increase the buoyancy of the pelagic larva, while in the case of *Limnetis* it is probably for the sake of protection from enemies, thus again recalling the turtle.

As stated by Prof. G. O. Sars on p. 128 in his wonderfully detailed and instructive account of the Norwegian Euphyllopoda (Fauna Norvegiae, Kristiania, 1896) he has never been able to observe or hatch larvae of *Limnetis*, though of the other clam shrimp (*Limnadia*) occurring in Norway, as well as of the fairy-shrimps and tadpole-shrimps, he gives detailed accounts and figures of the young stages. It was therefore as great a pleasure to him as to me, that the nauplii of *Limnetis* now have been collected at Ottawa; and I think that all people interested in the different branches of natural history will join me in appreciation of the fact that he, in spite of his 85 years and the much other work (Crustacea of Norway) he is principally engaged upon, not only made a careful examination of the nauplius, but also made a beautiful drawing of it, as of the young *Lepidurus arcticus*, and gave me a free hand in having them reproduced in Canada.

When we recall the vast numbers in which *L. gouldii* are found in the pools where they occur and the fact that on April 22, 1922, I was only able, in the course of more than an hour, to get six specimens (four of which were nauplii), there can be little doubt but that they had hatched a couple of days earlier (say about April 20); thus a fortnight later than the hatching of *Eubranchipus gelidus* here, at Billings Bridge. It is also evident that there was an interval of a day or so between the hatching of the four nauplii and the two slightly older larvae collected; and that the great bulk of *Limnetis* eggs found in this and neighbouring pools had not yet hatched. If we consult the meteorological records for these days we shall find that the weather in the middle of April, from the 16th on, was mild, the minimum and maximum temperatures on the 19th being 34° and 56°F. This probably caused the hatching of some of the *Limnetis* eggs, i.e., those producing the six nauplii found three days later. The colder weather with temperatures between 26° and 42°F., of the 3 next days probably prevented the hatching of many, if not all, further eggs, as shown by the few larvae secured on April 22. In the end of the month, from April 24 on, the weather, however, became milder again, reaching a maximum temperature of 70°F on April 26; and on April 24 I secured 14 additional young *Limnetis* in the pool visited two days before. The fact that they were now all of a size of $\frac{3}{4}$ to 1 mm., and in the metanauplius stage (adult characters), and that I got so many of them, showed that the conditions for their hatching and growth now were favourable. From then on they occurred in great numbers in this pool until it dried up in the beginning of May, and in others adjoining; as at other places around Ottawa, until the end of June 1922 (see below).

It will be seen from Prof. Sars' drawing (Fig. 1) of the four *L. gouldii* nauplii from April 22, 1922, that they are a little older than the earliest stages figured by Grube and by Herrick and Turner. Thus their size is half a millimeter (the one figured 0.54 mm.), they being a little wider than long. In colour, when alive, the nauplius eye is blue-black; the oildrops, about 20 in number, scattered at the base of labrum, orange; the content of the intestine and the jaws (visible on each side below the eye, ventral view) greenish brown; the appendices (swimming and foliaceous legs), shell gland (beginning to double shell), and body, yellowish;

rostrum, lateral-cephalic horns, tail-end (furca) and the dorsal shield and labrum, paler. The large swimming-legs (second pair of antennae) have at their base a cheliform process ventrally. The beginning of half a dozen foliaceous legs can be distinguished alongside the abdomen; and they are covered on each side by a fold which is apparently the beginning of the double "clam-shell" of the adults. The abdomen ends in two spiny cercopods (processes) which are better set off from the dorsal shield than in the still younger stages.

The position of the ventral labrum-plate is not quite parallel to that of the dorsal shield, but is directed somewhat downwards, and forms an angle of about 45° with it. This probably also has importance in balancing the larva, when swimming. The entrance to the mouth of the larva is just behind this labrum-plate or upper lip. The cheliform process at the base of the first pair of antennae is well developed already at the earliest nauplius stage observed and is directed inwards towards the middle of the body; its main function is probably the grabbing of food particles and the directing of them into the mouth. The food of the nauplius is thus apparently the miscroscopic animals (protozoa, etc.) swimming free in the water or gathered around vegetation, etc. The furrow in the labrum is perhaps of importance in this connection.

The general outline of the dorsal shield of the nauplius is rounded-elliptical, with the anterior margin straighter. As the larva grows the dorsal shield stretches somewhat in length, and develops somewhat the outline of an orange.

Grube asserts that there is no sign of the first pair of antennae in the earliest stage observed; according to Herrick and Turner's (better) figure they, however, are present (see above). The paired eyes seem to appear fairly early; already at a size of half a millimeter (of the larva) the rudiments of them are to be seen just behind the large nauplius eye. The detailed nature (lens brain, etc.) of the surroundings of the eye, even in the earliest stage, is remarkable and is commented upon by Grube. At this stage the dorsally situated heart is also to be observed, covered by the intestine; as also half a dozen pairs of foliaceous legs, though the latter are not yet capable of any movements.

According to Grube there was an interval of two days (about 48 hours) between the two youngest larvae stages he describes and figures (Tab. VI); while the next stage (third day) he describes corresponds in the number (6-7) of foliaceous legs developed fairly close to Sars' figure reproduced here. We can therefore safely assume that there is an interval of 2-3 days between the stage figured by Herrick and Turner and the nauplii collected at Billings Bridge, Ont., on April 22, 1922.

On the third day of his observations Grube noticed the orange-coloured oildrops which are scattered at the base of the labrum, back of the liver, and which are so conspicuous a character of Euphyllopod larvae in their metanauplius stage. Also the first traces of the vascular system were seen, in the shape of clear, small, oval bodies migrating inside the body, according to the rhythmic (160 times in the minute) contractions of the heart; the latter stretches from the first to the fourth pair of foliaceous legs. He also observed the traces of the smooth, double shell or carapace later enveloping the body, but at present only the foliaceous legs (See *s* in Sars' drawing); but gives unfortunately little information about its origin and growth. According to Sars' account of the development of other Conchostraca (*Limnadia*) the carapace originates as two small, rounded folds, alongside the first pair or two of foliaceous legs, and each containing a large shell gland. They quickly grow together dorsally and increase in size. This is also the case with *Estheria*, so we may assume it holds good for *Limnetis* too.

The actual moulting of the temporary larval dorsal shield for the final, double carapace was observed a couple of times by Grube, who describes it thus. The cuticula-skin bursts at a place covered by the labrum-plate on the ventral side; the animal pushes its head (the lateral, cephalic horns are not reproduced in the new shape of the young) out of the labrum-plate and the abdominal part of the old skin; by continuous movements of the second pair of antennae and the foliaceous legs it succeeds in also getting the abdomen pushed through the opening (the paired shell or carapace has not yet attained its later size and firmness); and in less than four minutes the whole process is finished.

The resulting young *Limnetis*, estimated by Grube to be 4-5 days old, has far more of the adult characters than of the ones characteristic for the preceding nauplius and metanauplius stages. It will be seen from the description given of the earlier stage that there is no sharp distinction between the nauplius and metanauplius stages of this genus; the former is mainly characterized by the lack of development of the abdominal region, which in the latter stage is more free of the dorsal larva-shield, more spiny and moveable and with the beginning of the development of appendages (foliaceous legs and cerepods). Both stages have, however, in common, the nauplius eye; lateral, cephalic horns; well developed,

swimming legs; large, temporary, dorsal shield; and the only a little smaller labrum-plate ventrally. It will also be seen from what has been said that with *Limnetis* the larval (nauplius and metanauplius) stage is very short (less than a week); though the life of the individual after the attainment of most of the adult characters is quite long (at Ottawa almost 2 months). This is interesting because with the two other common clam-shrimps, *Limnadia* and *Estheria*, the nauplius stage, characterized by a single eye, no shell, unsegmented abdomen, etc., is well defined, but of very short (a couple of days) duration; while the metanauplius stage, characterized by the beginning of the outgrowth of the paired shell or caparace, and of the foliaceous legs, in addition to several nauplius characters, is of very long duration (about a month).

The Fig. 11, Plate 48, given by Herrick and Turner, picturing a ventral view of the hind part of an older *Limnetis* larva, must, according to the presence of labrum, the ca. 7 foliaceous legs, and the well developed anal processes, be the stage just before the first moulting.

One of the six larvae (young) from Billings Bridge, Ont., April 22, 1922, had a size of ¾ mm. and had apparently just moulted (transformed). It still retained a larval character in the shape of the large labrum-plate, which, as in the nauplius stage, has a long, pointed process pointing backwards, ventrally, as is found in larval *Limnadia* (see Sars, 1896, Tab. XVIII), a remnant of which is found even in the adults. It had, however, no cephalic, lateral horns, but the beak-shaped head or rostrum, the paired eyes and the double shell or carapace, etc., of the adults. It is thus a wee bit younger than the stage described by Grube as coming as the result of the first moulting; because in Grube's stage the labrum and the cercopods are less conspicuous. (Tab. VII, fig. 21).

It should have been mentioned that the retrograde development of the anal processes or cercopods from the larval to the adult stages is an important feature characteristic of all Conchostraca, as contrasted to the Anostraca and Notrostraca, where they are less developed in the larval stages, but greatly in the adult. The reason for this is apparently that the larval (metanauplius) Conchostraca move around not only by the aid of the swimming legs (A^2 and *Mp.*), but also by twistings of the abdomen, at the end of which the cercopods are situated. As the paired shell or caparace grows in size and adheres to the body, the moving around is effected by the second pair of antennae and the foliaceous legs; while the cercopods become more or less useless for anything else than balancing purposes, and therefore are obliterated.

The size of the double shell, or carapace, of *Limnetis* at the time of the first moulting seems to be only about half of that of the temporary dorsal shield; but immediately after moulting it apparently grows fast, because the just moulted (transformed) larvae observed both by Grube and myself had the double shell, or caparace, surrounding all of the body except the head. The retrograde development of the large labrum-plate to a much smaller, slender and movable "lip" must also take place quickly, according to the two young specimens, the younger of which (with large labrum-plate) was collected on April 22, 1922, and the older of which is figured by Grube (Plate VII, fig. 21). In Grube's larva the mandibular palp does not any more serve as the second pair of swimming legs, but has attained its intended function among the mouth-parts, and decreased in development. The young character of his larva is, however, emphasized by the few joints which the branches of the second pair of antennae still possess; and also by the fact that only the first seven of the dozen foliaceous legs are well developed, and aid in the swimming and respiration, while the last pairs are still in formation. The paired eyes, double (open) shell, grown together dorsally, and other characters mentioned, show, however, that it is practically as the adults.

Apparently this larva stage described and figured by Grube is practically the same stage as the largest of the six larval *Limnetis* collected on April 22, 1922; my specimen being 1 mm. wide (shell measure), while Grube gives ⅓ line as the length of the carapace of his larva.

The 14 young *L. gouldii* I secured at Billings Bridge on April 24, 1922, had a size of ¾ to 1 mm. and the appearance of the two biggest of the ones collected two days before. Even the smallest ones of them had the double shell, or carapace, paired eyes, beak-shaped rostrum, etc., of the adults. In colour they were yellow-brown-orange (shell paler), with black eyes and dark intestinal content. I got most of them at a depth of one foot from the surface, around the algae-covered tips of grass-leaves (maximum depth of pool about 2 feet.)

When on May 2 I visited the same pool it was almost dried up, and I could see no *L. gouldii* in it. In the larger pond adjoining it, there were, however, a great many young *L. gouldii* in the shallow water along the margin, swimming around between the algae-covered, submerged grass-tips. In size they measured from ¾ to 1½ mm.; and I noticed that the orange colour of the youngest ones was much paler (more yellowish) than in the oldest ones. Temperature of water 60°F. (Air

57°F.) at 7 p.m.; overcast. I kept some of them alive for 18 days in a glass afterwards.

The next time I found *L. gouldii* was on May 22 at Tenaga, P.Q. (see p. 89 in *Canadian Field-Naturalist*, for May, 1921), where they were extremely common in the pond. They had a size of 2 to 3 mm., and a vivid, orange-red colour. They were mainly found at the algae-covered tips of submerged grass or dead leaves; and some of the females had a few eggs inside the shell. I kept some of them alive until June 18.

On May 28, I noticed them common and lively, swimming around in the pasture-pond (see photo of July 1, 1919) at Graham Bay Station, Britannia, Ont., in the shallow water along the margin (mud bottom). In size they measured from 2½ to 3½ mm., and their colour was more brownish (less bright red) than that of the ones from a week before. There seemed to be very few males; most of those seen were females with eggs. This adds a sixth locality to the records of its occurrence around Ottawa; half of the places being on the Quebec and half on the Ontario side of the Ottawa River.

Finally, on June 18, I again went to the pools and ponds at Billings Bridge, Ont. They now contained only a little water, and nothing at all in the smaller pools. In spite of a couple of hours' wading around and searching, I saw and secured only one dozen *L. gouldii*, all full grown, where a month ago they occurred in hundreds. A couple of them were apparently males, the rest females with the green eggs shining through the shell. Most of them had a brownish colour, and a growth of white infusoria or green algae on their shell, a sign that their time would soon be ended; they were, however, lively enough in their movements. We have thus additional and very definite evidence now, that their life at Ottawa lasts almost exactly two months, from the time of the hatching of the hibernating eggs in April.

EXPLANATIONS TO THE PLATE (*Original*)

FIG. 1.—Dorsal view of a 0.54 mm. large *Limnetis gouldii* larva (metanauplius) from Billings Bridge, Ottawa, Ont., April 22, 1922. F. Johansen, coll.

FIG. 2.—Dorsal view of a 1.42 mm. (somewhat contracted) *Lepidurus arcticus* larva (young) from Novaja Zemlia, Arctic Russia, June 23, 1875, (Riks-Museum, Stockholm).

FIG. 2*b*.—Telson and caudal filaments of the same larva enlarged, (dorsal view).

FIG. 2*a*.—Anal opening, with the beginning to the "caudal lamina", still more magnified (dorsal view).

LEGEND:—*D*, dorsal shield (in fig. 2 the later carapace); *L*, ventral plate (labrum); a^1, first pair of antennae; a^2 second pair of antennae, with *x* the cheliform basal process; *h*, lateral cephalic horns; *e*, eyes (nauplius eye and paired eyes behind); *m*, mandibles; *mp*, mandibular palp; *P*, foliaceous legs in development; *s*, the double shell (carapace) developing; *C*, caudal filaments (cercopods).

ADDITIONAL NOTES ON THE BIRDS OF THE GASPÉ PENINSULA

By CHAS. W. TOWNSEND, M.D.

IN *The Canadian Field-Naturalist*, Volume XXXIV, 1920, pp. 78-80 and 87-95, I published an account of the Percé, Bonaventure and Grand Grève regions of the Gaspé Peninsula, with notes on the birds observed there by me in the summer of 1919 together with notes made by Mr. P. A Taverner in 1914 and 1915. One hundred and twenty-one species were listed.

The months of July and August, 1922, were again spent in the Gaspé Peninsula, this time on the north coast between Cap-Chat and the end of the Forillon at Grande Grève. From Ste.-Anne-des-Monts I climbed Mt. Albert, 3,640 feet, in the Shickshock Mountains, spending July 10 and 11 on the summit, and, with my wife, made a leisurely walking trip of about a hundred and fifty miles along the single road of the coast as far as Grande Grève, where we arrived on August 13 and where we stayed until the end of the month.

Most of the north shore of the Gaspé Peninsula is bordered so closely by the foot-hills of the Shickshock Mountains that there is little level land, except on the terraces in the narrow valleys at the mouths of the rivers which cut through the mountain range and empty into the Gulf. At the mouths of these valleys, many of which are extremely beautiful, with their surrounding forested mountains and rocky cliffs, are the little villages of fishing and farming communities of French habitants. They are an interesting and primitive people, owing to their isolation, and we found them very polite and hospitable. The road which connects the villages, which are never more than ten or fifteen miles apart, is sometimes a mere track on the edge of the beach under the lofty

cliffs, or a rough road, called a *portage*, going back through the forest over little mountains sometimes twelve or fourteen hundred feet high.

The forest is largely white spruce and balsam fir. Black spruce is common farther inland. Northern white birch, poplars, sugar, mountain and striped maples and arbor vitae are common. Larches, yellow birches and mountain ashes are uncommon and white pines are rare. The summit of Mt. Albert is above tree level and is arctic in character I have given an account of this region, together with a report of its birds, in *The Auk* for January, 1923.

I am greatly indebted to Dr. R. M. Anderson, Mr. Harrison F. Lewis and Dr. John C. Phillips, all of whom visited Gaspesia in the summer of 1922, for additional notes which they have kindly permitted me to include here. Dr. Anderson ascended the Cascapedia River in August, made a station near its headwaters, at the Federal Mine, 1800 feet, ascended Mt. Albert, remaining there during most of September, and in October, returning, crossed to the south coast. Mr. Lewis was at Gaspé, Percé and Cap-des-Rosiers or on the waters adjacent to the Peninsula from May 20 to June 10. Dr. Phillips ascended the Cascapedia to its headwaters and was in Gaspesia from August 22 to September 10.

A hundred and one different species of birds were observed during my stay. Thirteen of these have not been noted in the previous list. Dr. Anderson has added five not previously noted; Mr. Lewis, three; and Dr. Phillips, one; making twenty-two additional species in all. These are as follows:—

1. *Gavia stellata.* RED-THROATED LOON.—One was seen by Mr. Lewis on May 23 at Cap-des-Rosiers.

2. *Mergus americanus.* MERGANSER.—A young bird was seen by me on July 12 on a rock in the Ste. Anne River about eighteen miles from its mouth. Joe Fortin, the guide, told me that he had seen the "big bec-scies" in winter in some of the rapids that did not freeze. Dr. Phillips found this, as well as the Red-breasted species, common on the Cascapedia River. Dr. Anderson took one on September 30 on Lake Ste. Anne.

3. *Branta bernicla glaucogastra.* BRANT.—Mr Lewis saw a hundred close to the shore at Carleton, on May 20, and eight at Cap-des-Rosiers on May 24. Brant collect in the Bay of Seven Islands, southern Labrador, before migrating across the base of the Labrador Peninsula to James Bay. The average dates that Mr. Bent and I obtained for this migration at the Bay of Seven Islands are May 25 to June 20. (*Auk*, XXVII, 1910, p. 12).

4. *Charadrius dominicus dominicus.* GOLDEN PLOVER.—Dr. Anderson saw ten on the summit of Mt. Albert on August 29.

5. *Canachites canadensis canace.* SPRUCE PARTRIDGE.—A hen bird and her brood of young were seen on the summit of Mt. Albert on July 11. Dr. Anderson took six specimens at the Federal Mine; three were adults taken on September 14. Mr. P. A. Taverner writes me that he has "no hesitation in referring the Gaspé females to *canace*."

6. *Accipiter cooperi.* COOPER'S HAWK.—One was seen by me on August 16 at Grande Grève. Another, or the same bird, was seen the next day four miles away at Ship-Head under very favorable circumstances, as the bird alighted in a tree within forty feet of me, so that its short wings and long, rounded tail could easily be seen. The keeper of the light told me that two of his hens had recently been killed by Hawks, one of which had flown between him and the house as he sat on the gallery. These characteristics of fearlessness and destructiveness are common in the Cooper's Hawk.

7. *Cryptoglaux acadica acadica.* SAW-WHET OWL.—Dr. Phillips writes: "A pair near the forks of Cascapedia and others heard, probably a common owl."

8. *Bubo virginianus virginianus.* GREAT HORNED OWL.—Several rather light-colored birds were seen by Dr. Anderson near the Federal Mine and the Ste. Anne River.

9. *Dryobates villosus leucomelas.* NORTHERN HAIRY WOODPECKER.—Several were seen at Ste-Anne-des-Monts and at Rivière-à-la-Martre. Two were seen by Dr. Anderson. No specimens were taken but I have assumed that the sub-species was *leucomelas*.

10. *Picoides arcticus.* ARCTIC THREE-TOED WOODPECKER.—A pair were seen by me on July 13 in the valley of the Ste. Anne River, and a male was seen on the top of a tall dead tree in the valley of the Madeleine River on August 2. This one called repeatedly a single note. Dr. Anderson obtained two specimens.

Mr. Harrison F. Lewis has called my attention to a previous record of this bird near Gaspé by Mr. William Brewster. (*Notes on the Birds observed during a summer cruise in the Gulf of St. Lawrence.* Proceedings Boston Soc. Nat. Hist., vol. 22, 1883, p. 381.)

11. *Phlœotomus pileatus abieticola.* NORTHERN PILEATED WOODPECKER.—Reported by Dr. Anderson.

12. *Antrostomus vociferus vociferus.* WHIP-POOR-WILL.—Dr. Anderson heard one calling.

13. *Nuttallornis borealis.* OLIVE-SIDED FLY-CATCHER.—I found this bird to be common in the forests along the wild north shore.

14. *Otocoris alpestris alpestris.* NORTHERN HORNED LARK.—I found this bird in considerable numbers on the extensive table-land on the summit of Mt. Albert on July 10 and 11. Fully twenty pairs were breeding there and the adults were seen feeding the young. I secured two adults, one of which has been sent to the Victoria Memorial Museum at Ottawa. This discovery extends the breeding range to the south of the Gulf of St. Lawrence. (See *A Breeding Station of the Horned Lark and Pipit on the Gaspe Peninsula.* (*Auk*, XL, January, 1923.)

Mr. Lewis saw a Horned Lark on May 22, near Gaspé Harbor and Dr. Anderson saw the species on Mt. Albert and, on September 27, he saw many migrants about the Federal Mine.

15. *Dolychonix oryzivorus.* BOBOLINK.—Dr. Anderson learned that this species "was fairly common on some of the hay meadows" near the southern coast.

16. *Euphagus carolinus.* RUSTY BLACKBIRD. —One was seen by me at Ste.-Anne-des-Monts on July 7. Dr. Anderson saw one near Lake Ste. Anne on September 30.

17. *Poœcetes gramineus gramineus.* VESPER SPARROW.—Several were seen at Ste-Anne-des-Monts and at Madeleine during July. They were in full song.

18. *Passer domesticus.* ENGLISH SPARROW.—I regret to be obliged to record that this alien is abundant at Ste-Anne-des-Monts and is found at all the little villages along the coast to the eastward as far as and including Mont-Louis. Even at Marsouins, a little isolated valley where there are only five families, I saw this bird. It was seen again at Chloridorme and at Fox River. It was often to be seen on the fish-flakes.

19. *Melospiza georgiana.* SWAMP SPARROW.—Mr. Lewis saw one at Cap-des-Rosiers on May 24 and 25, and one at Gaspé on May 30. Although the Swamp Sparrow is not uncommon farther to the north, in southern Labrador, it appears to be rare in Gaspesia. This rarity is probably dependent on the rarity of swamps, and this, in turn, on the fact that the country is largely unglaciated. Professor A. P. Coleman has shown that the great Labrador glacier divided into two lobes, leaving the Gaspé Peninsula as an island, and that the local glaciers there were uncommon. Hence the streams have been cutting down for great periods of time, and the country is so well drained that lakes and swamps are rare.

20. *Vermivora rubricapilla rubricapilla.* NASHVILLE WARBLER.—I found this bird common back of Ste-Anne-des-Monts and in full song, and I saw it elsewhere on the coast. Mr. Lewis found several near Gaspé village on May 29 and 30. Brewster (*loc. cit.*) has previously recorded this bird near Gaspé Bay.

21. *Wilsonia canadensis.* CANADA WARBLER. —I saw several of these Warblers at Ste-Anne-des-Monts and one at Marsouins.

22. *Anthus rubescens.* PIPIT.—Common, breeding on Mt. Albert. This record extends the breeding range, as in the case of the Horned Lark, to the south shore of the Gulf of St. Lawrence (*See Auk, loc, cit.*) Mr. Lewis saw five at Gaspé on May 21. At Cap-des-Rosiers he saw four on May 23, one hundred on May 24, and three on May 25. These were, of course, late migrants. Dr. Anderson saw only a few on Mt. Albert the last of August. His latest date is September 2.

Mr. Harrison F. Lewis has very kindly called my attention to a paper published in the *Geological Survey of Canada. Report of Progress for the year 1858*, Montreal, 1859, pages 243-263, entitled *Catalogue of Animals and Plants Collected on the South-East Side of the St. Lawrence from Quebec to Gaspe, and in the Counties of Rimouski, Gaspe and Bonaventure*, by Mr. Robert Bell, Jr., assistant to Mr. James Richardson, Geological explorer under Sir. W. E. Logan, in 1858. The birds appear to have been identified from specimens by Mr. S. M. D'Urban. Four species new to my list are included, so that, with the twenty-two additional species obtained this summer, the list of birds for the Gaspé Peninsula now reaches one hundred and forty-seven species. The four additional ones of Bell are as follows:—

1. *Branta canadensis canadensis.* CANADA GOOSE.—Cap-Chat, June 17. This bird must be common during the migrations.

2. *Ectopistes migratorius.* PASSENGER PIGEON —Recorded from Metis to Ste-Anne-des-Monts, now, alas! extinct.

3. *Stryx varia varia.* BARRED OWL.—Recorded from the Marsouins River, the end of July.

4. *Agelaius phœniceus phœniceus.* RED-WINGED BLACKBIRD.—One at Ste-Anne-des-Monts, July 17.

Bell also records the Harlequin Duck (*Histrionicus histrionicus*) at the Ste. Anne River in July; the Cedar Waxwing (*Bombycilla cedrorum*) at Metis, Ste-Anne-des-Monts and the Marsouins River, and the Rusty Blackbird (*Euphagus carolinensis*) at the Metis River. I have but few records of these birds on my lists.

In addition Bell makes the surprising record of the Laughing Gull (*Larus atricilla*) for the "whole coast". This is the only Gull listed. It is possible, as Mr. Lewis sugests, that the only specimen of a

Gull brought back to Mr. D'Urban to identify was a Laughing Gull that had strayed to this northern coast and in support of the authenticity of the record, Mr. Lewis notes that at about this time Dr. Bryant secured two breeding Laughing Gulls near Yarmouth, Nova Scotia. In view of the uncertainty of the identification and the absence of the specimen, I have placed this species on the doubtful list.

The song season waned during our stay at Ste-Anne-des-Monts from July 6 to July 22, so that the observation of many land birds, especially the Warblers, was difficult after the latter date. Very few Warblers were seen after August first. At Grande Grève, from our arrival on August 13 until August 26, I saw of this group only two Water-Thrushes and two Myrtle Warblers, although I spent most of the time in the woods. It would seem as if practically all the resident Warblers had left and that none from the north had taken their place. On August 26, a stormy day with thick fog and southeast wind, I came on a flock of migrating birds containing several Water-Thrushes, four or five Black and White Warblers, a Redstart, a Blackpoll and a Wilson's Warbler, and a few Black-capped and Acadian Chickadees. On August 27 I found a group of four or five Winter Wrens. Other resident birds, like Juncos, White-throated, Song and Savannah Sparrows and Robins, diminished rapidly in numbers during August and their places were not taken by migrating birds from the north. White-winged Crossbills were, however, abundant in large flocks, and, on August 16, flock after flock of a hundred or more each flew swiftly by me from east to west in the middle of the Forillon. Dr. Anderson saw no Warblers except the Myrtle, the first of which appeared September 18th and which became fairly common later. Crows gathered in noisy flocks during the last of August, preparatory to leaving. Mr. Elias Gavey told me that a few spent the winter. Hawks of various species were migrating commonly.

On August 30 I walked nine miles along the road to Peninsula and made a careful census of all the birds seen. The road leads through spruce woods and cultivated fields, villages, gardens, and pastures, a region favorable for birds. The numbers of birds and of species was very small, as will be seen by the following list of land birds: Marsh Hawk, 1; Raven, 1; Crow, 20; White-winged Crossbill, 6; Goldfinch, 8; Savannah Sparrow, 9; White-throated Sparrow, 1; Junco, 2; Redstart, 1; Chickadee, 1; Acadian Chickadee, 1.

During the latter half of August in 1919, I had a similar experience here. Land birds with the exception of Hawks were very scarce. It would seem, therefore, as if this part, at least—the tip end of the Gaspé Peninsula—is generally but little visited in the fall by migrating land birds with the exception of the strong-flying Hawks. This may be explained on the assumption that migrants from the north cross the Gulf of St. Lawrence further to the west where it is narrower, or come down by the way of Newfoundland and the Magdalens. My observations in southern Labrador would tend to strengthen this opinion, for migration is mostly along the coast. Further observations are, however, needed to confirm this assumption. The flock of migrants observed on August 26 had evidently gone astray during the storm. A Water-Thrush flew into the light at Ship-Head on that night.

Additional observations on a few of the birds reported in the previous paper are appended.

Sterna hirundo. COMMON TERN.—Only one was seen along this north coast and that was at Grande Grève on August 24. From the train on September 1, I saw about fifteen Terns at Chandler on the south shore.

Sula bassana. GANNET.—Single birds were seen daily, fishing or flying along the coast as far west as Cap-Chat. The numbers seen increased as we travelled east. At L'Anse-à-Louise near Cap-des-Rosiers on August 12, between 6 and 6.30 p.m., I counted eighty-three Gannets flying east and thirty flying west. These were single birds or in numbers up to twenty. At Ship-Head at the eastern end of the Forillon—the narrow strip of high land to the north of Gaspé Bay—I saw Gannets rounding the point and heading towards the breeding cliffs at Bonaventure Island. I never saw any fly across the land. In this way they differ markedly from Double-crested Cormorants which were habitually flying across the Forillon.

Anas rubripes tristis. BLACK DUCK.—On August 1, in a pond near Manche d'Epée, I watched a brood of nearly full-grown young with their mother. At times the young would dive and remain under water from five to ten seconds. In shallow water, all were tipping in the usual manner.

Oidemia perspicillata. SURF SCOTER.—At Grande Grève under the Bon Ami cliffs on August 13 I watched a compact flock of thirteen full-grown young and one adult Surf Scoter. On August 23 the flock was composed of thirty young and five adults. It is of interest to speculate where the young were hatched.

Botaurus lentiginosus. BITTERN.—Mr. Lewis observed one at Cap-des-Rosiers on May 24.

Nycticorax nycticorax nævius.—BLACK-CROWNED NIGHT HERON.—I saw two of these birds at Ste-

Anne-des-Monts, two at Grande Etang and one at Anse-au-Vallon. Dr. Phillips saw only one during his trip and this was at the mouth of the Cascapedia River.

Totanus melanoleucus. GREATER YELLOWLEGS.—Dr. Anderson observed a single bird on top of Mt. Albert from August 30 to September 2.

Arenaria interpres morinella. RUDDY TURNSTONE.—One was seen by Mr. Lewis at Fox River on June 5.

Buteo platypterus. BROAD-WINGED HAWK.—I saw one or more at Grande Grêve on August 16 and 17, and, on August 21 saw one perched on the same tree in which I had seen one on August 24, 1919. Dr. Anderson saw one at Grand Cascapedia.

Falco sparverius. SPARROW HAWK.—Two were seen at Ste-Anne-des-Monts and one at Grande Grève. Mr. Lewis saw one at Bonaventure Island on June 2.

Pandion haliaetus carolinensis. OSPREY.—Rather common all along the coast. At Madeleine I observed one that was rising from the water with a fish whose tail pointed forward. While still rising, the Hawk adjusted its prey so that the head pointed forward, in the manner in which it is usually carried. At Grand Etang, on August 8, I noticed an Osprey calling frequently on the shore of the tidal pond. I approached it within thirty yards, when it arose heavily, dragging in its talons an enormous eel. The fish was so heavy that the Hawk could not lift it into the air but dragged it over the water and finally dropped it and flew away.

On August 31, at Peninsula, I saw an Osprey on a log that was stranded on the tidal flats. A Crow alighted at the end of the log and actively pursued some prey on the edge of the water, all the time watched by the larger bird. The Crow, keeping at a distance of at least three feet from the Osprey, flew around it to the other end of the log to continue its pursuit.

Chaetura pelagica. CHIMNEY SWIFT.—Two pairs of Swifts were seen at Ste-Anne-des-Monts and one pair over the forest eighteen or twenty miles up the river. Another pair was seen dropping into a wooden chimney at Marsouins on July 26, and one was seen at Chloridorme on August 7. At Grande Grève on August 17, I was shown the nest of this bird attached to the inside of the gable-end of a barn near a small square hole. It contained three moribund young, partly feathered. The old birds had recently been killed by a cat. Mr. Lewis saw two Swifts at Cap-des-Rosiers on May 25 and five at Gaspé on May 30, and Dr. Anderson took one at the Federal Mine on August 22. A pair was nesting in the shaft house.

Empidonax flaviventris. YELLOW-BELLIED FLYCATCHER.

Empidonax trailli alnorum. ALDER FLYCATCHER.—Both of these Flycatchers were common along the coast. While the former ceased singing its brief song, *je-let*, by the middle of July, the Alder Flycatcher continued to sing its *whee-zee* even as late as August 14. Mr. Lewis found the Alder Flycatcher common at Fox River from June 4 to 9.

Cyanocitta cristata cristata. BLUE JAY.—One was observed at Rivière-à-la-Martre, one at Marsouins and one at Manche d'Epée. Dr. Anderson found one near Lake Ste. Anne.

Perisoreus canadensis canadensis. CANADA JAY.—Mr. Lewis saw one at Gaspé. Dr. Anderson saw a few.

Corvus corax principalis. NORTHERN RAVEN.—Fairly common about the cliffs of the north coast. At St. Pierre, on July 28, a Pigeon Hawk darted down at a Raven flying under the cliffs. The Raven turned over momentarily and thrust its talons up at the Hawk, who dodged. This happened twice while I had both birds under observation in the field of my eight power binoculars. The Raven croaked and the Hawk screamed.

Pinicola eneucleator leucura. PINE GROSBEAK.—A few were seen along the coast. Several times in July and the first part of August, I heard their song, a clear sweet warble.

Loxia leucoptera. WHITE-WINGED CROSSBILL.—While *L. curvirostra minor* was rare, this species was abundant in flocks everywhere. I observed them eating the swollen, diseased ends of white spruce twigs, sometimes breaking them off and holding them with the foot while they eat them. On August 16, at Grande Grève, there occurred a large migration of these birds as already stated. I heard their song only a few times. This was early in July.

Zonotrichia leucophrys leucophrys. WHITE-CROWNED SPARROW.—Mr. Lewis saw one at Cap-des-Rosiers on May 23 and five on May 24. He saw two at Gaspé on May 30. Dr. Anderson saw a number at Federal Mine on September 28. These were all probably migrants. I saw none on the tableland of Mt. Albert.

Spizella passerina passerina. CHIPPING SPARROW.—I found this bird common at all the villages along the north coast and Dr. Anderson reports it common on the lower Cascapedia.

Melospiza lincolni lincolni. LINCOLN'S SPARROW.—Not uncommon and in full song up to July 26. After this the song season ceased and they were not found. Mr. Lewis saw one or two at Gaspé.

Hirundo erythrogaster. BARN SWALLOW.—A common breeder in the barns of the coast.

Iridoprocne bicolor. TREE SWALLOW.—Mr. Lewis found it very common in the spring migration the last of May. Fifty-five were seen at one time. I saw one or two at Ste-Anne-des-Monts on July 8 and one at Cap-des-Rosiers on August 12.

Riparia riparia. BANK SWALLOW.—A few breeding at Cap-Chat and at Ste-Anne-des-Monts. Mr. Lewis reported a thriving colony near the Gaspé railway station.

Vireosylva olivacea. RED-EYED VIREO.

V. philadelphica. PHILADELPHIA VIREO.—I saw at close range and plainly identified a number of each of these species, and believe that the Philadelphia Vireo is a common summer resident, the Red-eyed, less common. When I was at Percé in 1919, I thought that the slower and less continuous character of the song as described by Dwight (*Auk*, XIV, 1897, p. 267) was sufficient to distinguish the songs of these two species. This year, however, I discovered that several birds, singing hurriedly like the Red-eyed species, proved to be Philadelphia Vireos. One which sang repeatedly and hurriedly *seigniorie oui oui* with scarcely a pause proved to be a Philadelphia Vireo. I regret that I did not count the song-phrases in the minute, as practiced by Mr. Lewis. The call-notes are different, the Red-eyed's like a cat's mew, the Philadelphia's, harsher. Lewis (*Auk*, XXXVIII, 1921, p. 197) suggests that a Red-eyed Vireo, who was a close neighbor of a Philadelphia Vireo, might have had his song "affected by his nearby relative". This may account for my difficulty in distinguishing the songs apart this summer. On May 29, at Gaspé, Mr. Lewis observed a male Philadelphia Vireo singing at the rate of thirty song-phrases a minute, and, on May 30, at the rate of twenty-four song-phrases a minute.

Lanivireo solitarius solitarius. BLUE-HEADED VIREO.—Common and in song up to the last of July.

Dendroica tigrina. CAPE MAY WARBLER.—Mr. Lewis saw a pair at Gaspé.

D. aestiva aestiva. YELLOW WARBLER.—A pair feeding young were seen by me at Ste-Anne-des-Monts. Mr. Lewis found one or two at Gaspé, Bonaventure Island and Fox River.

D. cærules en: cærulescens. BLACK-THROATED BLUE WARBLER.—Mr. Lewis found a male in full song at an elevation of about a thousand feet in the St. Albans Mountains on May 24. This must have been near the same spot where I found the only other record for the Peninsula on August 8, 1919.

Seiurus aurocapillus. OVEN-BIRD.—Common at Ste-Anne-des-Monts. Mr. Lewis found five in song on May 30 at Gaspé.

Oporornis philadelphia. MOURNING WARBLER.—I saw one at Marsouins on July 26.

Geothlypis trichas trichas. MARYLAND YELLOW-THROAT.—Although I made an especial search for this bird, I found only one. This was on July 17 at Ste-Anne-des-Monts in one of the rare bogs of this non-glaciated country. Mr. Lewis saw one at Cap-des-Rosiers on May 25. This bird is found in southern Labrador.

Wilsonia pusilla pusilla. WILSON'S WARBLER.—I saw several times early in July a pair feeding young at Ste-Anne-des-Monts. I saw one at Grande Grève on August 26. Mr. Lewis saw three at Cap-des-Rosiers on May 24 and one at Fox River on June 9.

I have now the record of twenty different members of the Warbler family in the Gaspé Peninsula. all but two of which, the Cape May and the Black-throated Blue Warblers, were seen by me on this excursion.

Sitta canadensis. RED-BREASTED NUTHATCH.—Common on the sides of Mt. Albert and near the falls of the Madeleine River. Mr. Lewis records one at Gaspé on May 23.

NOTE.—I found no Ptarmigans on Mt. Albert and was informed by Joe Fortin, the guide, that he had never seen them on any of the mountains. He told me that in April, 1918, he saw five "white partridges" flying north over the ice of the Gulf from Ste-Anne-des-Monts.

A BIOLOGICAL RECONNAISSANCE OF PORTIONS OF NIPISSING AND TIMISKAMING DISTRICTS, NORTHERN ONTARIO

By J. DEWEY SOPER

(*Concluded from Vol. XXXVI, No. 9, p. 176*)

Ondatra zibethica Linnaeus. MUSKRAT.—Muskrat signs were seen on the Ababika and Wakimika Rivers, Sucker Gut Lake, N.E. Arm Lady Evelyn Lake, and at several places on the Montreal and Matabichouan Rivers.

Mustella cicognanii Bonaparte. BONAPARTE'S WEASEL.—An example of this species was found

dead on the upper end of the portage trail at the Ragged Chutes, Montreal River, September 2.

Evotomys gapperi gapperi Vigors. RED-BACKED VOLE.—Apparently scarce throughout the region this year. I trapped several on an island in Temagami Lake just north of Bear Island; they were apparently the only small mammal inhabiting the island.

Peromyscus maniculatus maniculatus Wagner DUSKY WHITE-FOOTED MOUSE.—Trapped at nearly every camp in the Temagami Forest Reserve, but strangely enough I failed to take it on the Montreal River. My first specimen, collected on Ababika Lake, September 2, seems to show characters between those of this form and those of *gracilis*. It is in the act of shedding; unrenewed portions of the back, dark russet and somewhat contrasted with the dorsal stripe. Upper part of the tail brownish instead of black. Ears, orbital regions and base of the whiskers less dark than those of any of the other specimens taken farther north. Remainder of specimens taken progressively northwards are decidedly dusky, and seem to answer fully to the typical characteristics of *maniculatus*. They appear similar in all respects to typical *maniculatus* taken by me at Ridout, Northern Ontario. (*The Canadian Field-Naturalist*, Vol. XXXIV, No. 4.) I was most successful in trapping these animals along the margins of lakes flanked by thick, mossy woods.

Zapus hudsonius Zimmermann. HUDSON'S BAY JUMPING MOUSE.—I trapped this species at but one locality—on the shrubby beach at Wakimika Lake, September 4. They were inhabiting this locality with the rarer species, *insignis*.

Napæozapus insignis (Miller). WOODLAND JUMPING MOUSE.—This beautiful and rare animal I first collected at the Narrows on Ababika Lake, September 2. The following night I captured my second and last specimen at Wakimika Lake, where it was associating with the preceding species on the sandy beach at the north end of the lake. The beach at the point of capture is sprinkled liberally with low shrubbery and intersected by a small brook. By the profusion of small trails in the sand under this shrubbery it was evident that it must be the regular foraging ground of these little animals. The locality reminded me strongly of Point Pelee, whose sandy beaches are usually is well inhabited by the beach, or prairie deer-mouse, *Peromyscus m. bairdi*. The capturing of the woodland jumping-mouse at this place extends its range evidently about one hundred milse north of the farthest point from which it was previously recorded. The two specimens measure: Length, 227♂, 230♂; Tail Vertebrae, 150, 147; Hind foot—32, 31. Both have white tail-tips about ten mm. in length.

Eutamias quadrivittatus neglectus (Allen). LAKE SUPERIOR CHIPMUNK.—According to my observations this species is very scarce in the Temagami Forest Reserve. I noted it first at Ababika Lake, where it was running about in the sunshine on the margin of the forest, apparently gathering winter stores. Later in the day one was glimpsed from the canoe many miles to the north. We did not see it again until below Latchford, on the Montreal. I saw two at the Hound Chutes and several more later in the day at the Ragged Chutes where they were dashing briskly about in the thick woods adjoining the river. Many were noted the following day, but none below Poigan Rapids where the Transition element was the most pronounced.

Tamias striatus lysteri (Richardson.) EASTERN CHIPMUNK.—This animal was not observed at all until after rounding the "Big Loop" on the Montreal River below Latchford. Then it began to appear with increasing frequency as we descended the river. In my journal for September 8 I find the following entry: "Latchford to Hound Chutes, Sept. 8.—Chipmunks became very much in evidence to-day as we descended the river. The character of the forest has appreciably changed, not so much heavy timber, more glades and scrub maple, which seems in some way to impart a sunnier disposition to the country. Apparently favors the chipmunks, for all the way, as the canoe slipped silently along, we could hear the staccato cluckings of these animals." Again—"Ragged Chutes to Poigan Rapids, September 9.—As we descended the Montreal to-day, chipmunks of both species, but particularly the large species, became quite perceptibly more numerous. All day they were either seen or heard along the banks of the stream. The darker forests have almost totally disappeared, due to lumbering and fire, and extensive areas of poplar, birch and scrub maple have sprung up, intermixed to a certain extent with the original tenants of the land—the spruces, pines and balsams. The effect is one of greater warmth; the gloom and austerity of the primeval forest is largely lacking and both bird and mammal life have in consequence seemed to increase with this condition" At our last camp a mile or two below Poigan Rapids, this species was still very common, but it was not again observed after leaving this place.

Sciurus hudsonicus hudsonicus. (Erxleben). NORTHERN RED SQUIRREL.—The red squirrel was seen in abundance practically everywhere throughout the region.

Castor canadensis (Kuhl). CANADIAN BEAVER —I saw the work of beavers at but two places—

once near Abawanga Narrows on the north-east arm of Lady Evelyn Lake, and again on a small tributary of the Montreal River a few miles below Poigan Rapids. The first evidence was merely that of some fresh cuttings, but the latter was a fresh-built dam that spanned the stream above mentioned.

Microtus pennsylvanicus fontigenus (Bangs.) FOREST MEADOW-MOUSE.—I collected the forest meadow-mouse at but one point—just above Sucker Gut Falls, Lady Evelyn Lake. Signs of them were observed at several localities on the Montreal River, particularly at Fountain Falls. Most of these places were on portages en route between night camps when trapping was impossible.

Odocoileus americanus (Miller). NORTHERN VIRGINIA DEER.—Numerous trails noted on Ababika River and Wakimika Creek. On September 10 a pair of fawns were reported to us as having been seen near the Notch Canyon on the Montreal River. One was heard after night at our camp below Poigan Rapids, the trail furnishing identity the following morning. A fresh trail was seen on the top of Beaver Mountain. From these signs I judge the species to be more or less evenly distributed throughout the region.

Alces americanus (Jardine). MOOSE.—Moose trails were observed on numerous occasions in the Temagami Reserve, but not on the Montreal River. Formerly they were very common on this waterway. Moose are said to be plentiful on the Sturgeon River, just west of the reserve. We saw a cow feeding with her calf in a deep bay on Lady Evelyn Lake, and a "yard" of a small band of the previous winter back of camp on Ababika Lake.

THE BIRDS

1. COMMON LOON. *Gavia immer*.—The species was noted at nearly every point throughout the region. Greater numbers were present, however, on Lake Temagami and neighboring waters than elsewhere, with a gradual diminution as we descended the Montreal.

2. HERRING GULL. *Larus argentatus*.—This species, like the last, was most common on the Temagami Lakes. Only one or two were seen on the Montreal River.

3. AMERICAN MERGANSER. *Mergus americanus*.—First observed on Ababika Lake, September 1, and then daily seen until the end of the trip on Lake Timiskaming. Their points of abundance were centered, however, on Ababika and Lady Evelyn Lakes, particularly in the region about Abawanga and Waswaning Narrows.

4. BLACK DUCK. *Anus rubripes*.—Not observed until we had reached Pine Point and Waswaning Narrows on the Evelyn River. About a dozen all told were noted during the short period of our passage down stream at this place. Next and last observed on a placid stretch of the Montreal River between Latchford and the Hound Chutes.

5. AMERICAN GOLDEN-EYE. *Claucionetta c. americana*.—A number observed on Sucker Gut Lake and upon the long calm stretch of the Montreal River between Poigan and "The Notch" Rapids.

6. GREAT BLUE HERON. *Ardea herodias*.—Uncommon. First seen on Sucker Gut Lake. A couple were observed on the Montreal.

7. WILSON'S SNIPE. *Gallinago delicata*.—Flushed a single individual from the grassy river margin at Waswaning Narrows, September 7.

8. PECTORAL SANDPIPER. *Pisobia maculata*.—A solitary individual seen feeding at close range on the river's edge near the Notch Rapid on September 10 is believed to have been of this species.

9. LEAST SANDPIPER. *Pisobia minutilla*.—A pair of Sandpipers referred to this species was seen at Fountain Falls, September 8.

10. SOLITARY SANDPIPER. *Helodromas solitarius*.—But four individuals of the Solitary Sandpiper were seen on the numerous waterways which we travelled. Two of these were seen while we were descending the Ababika River; the third on Wakimika Creek; and the last on Diamond Lake near the Evelyn Falls.

11. SPOTTED SANDPIPER. *Actitis macularia*.—Noted with greater frequency than the last species but confined to almost precisely the same general localities. Unlike the Solitary, however, it seems to prefer the open beaches of the lakes rather than the gloomy margins of the wilderness streams.

12. RUFFED GROUSE. *Bonasa umbellus togata*.—Distributed fairly evenly throughout the region. Noted more frequently, however, upon leaving the denser forests of the Reserve at the Mattawabika Falls.

13. MARSH HAWK. *Circus hudsonius*.—Sparsely distributed. One observed at Bear Island, Lake Temagami.

14. AMERICAN GOSHAWK. *Astur atricapillus*.—One only seen—Notch Rapids, Montreal River, September 10.

15. RED-SHOULDERED HAWK. *Buteo lineatus*.—One recorded for September 10, Sucker Gut Lake.

16 BROAD-WINGED HAWK. *Buteo platypterus*.—A single record for an individual on Ababika Lake, September 2. This species, like the rest of the tribe, was very scarce. Days slipped by without our sighting a single Hawk of any description.

17. AMERICAN SPARROW HAWK. *Falco sparverius*.—Almost at once upon our leaving the railway on August 29, one of these pretty Hawks flew past us among a scattering of islands on the lake. The species was not again observed until September 9, when a single one crossed our bows as we descended the Montreal River below Poigan Rapids. The following day while we were engaged on the "Notch" or Long Portage, three were seen simultaneously over the fields of a solitary farm. The influence which this clearing of perhaps a hundred acres had upon the birds was no less than remarkable. Birds were not only abundant, but several species were now met with for the first time.

18. AMERICAN OSPREY. *Pandion haliaetus*.—One Osprey was noted on Diamond Lake, September 4, and two others were seen the following day on Lady Evelyn Lake.

19. GREAT HORNED OWL. *Bubo virginianus*.—Several times seen or heard on the lower Montreal. River.

20. BELTED KINGFISHER. *Ceryle alcyon*.—Tolerably common throughout the region; more so on the Montreal River. Fish are fairly plentiful, hence the general distribution of this bird.

21. HAIRY WOODPECKER. *Dryobates villosus*.—Only three recorded: Wakimika Lake, September 3; Montreal and Matabichouan Rivers, September 8 and 10.

22. DOWNY WOODPECKER. *Dryobates pubescens medianus*.—More evenly distributed than the last species. Commonest of the Woodpeckers.

23. ARCTIC THREE-TOED WOODPECKER. *Picoides arcticus*.—Only twice observed—Temagami and Wakimika Lakes.

24. PILEATED WOODPECKER. *Phlœotomus pileatus abieticola*.—One record for Diamond Lake, September 4.

25. NORTHERN FLICKER. *Colaptes auratus luteus*.—Moderately common everywhere. Notable increase in numbers observed as the Montreal River was descended below Latchford, suddenly augmented at the farm, "Long Portage", Lake Timiskaming. The influence of this cultivated area on the birds has been previously mentioned.

26. WHIP-POOR-WILL. *Antrostomus vociferus*.—One was heard back of camp on the evening of September 10, at the base of Beaver Mountain, Matabichouan River.

27. RUBY-THROATED HUMMINGBIRD. *Archilochus colubris*.—A single male observed in the heavy coniferous forest flanking the North-west Arm of Temagami Lake, September 1.

28. WOOD PEWEE. *Myiochanes virens*.—A single example seen on a sunny slope grown to red pines and birches, September 1. Same locality as the last.

29. BLUE JAY. *Cyanocitta cristata*.—Sparingly distributed in the Temagami forests, but noted with increasing frequency as the Montreal River was descended, eventually becoming quite common.

30. CANADA JAY. *Perisoreus canadensis*.—Much less common than the last. Most frequently noted in the heavy forests surrounding Temagami Lake.

31. NORTHERN RAVEN. *Corvus corax principalis*.—Uncommon. Three only observed—two on Diamond and one on Gut Lake.

32. AMERICAN CROW. *Corvus brachyrhynchos*.—Comparatively rare in the Temagami Reserve. Heard or seen with greater frequency on the Montreal.

33. RED-WINGED BLACKBIRD. *Agelaius p. phœniceus*.—Only twice recorded—marshes at Gut Lake, and in the vicinity of the "Long Portage", Lake Timiskaming.

34. RUSTY BLACKBIRD. *Euphagus carolinus*.—Twice seen frequenting the muddy borders of Ababika River and Wakimika Creek, September 2 and 3.

35. BRONZED GRACKLE. *Quiscalus quiscula æneus*.—A few individuals seen on Ababika River and Wakimika Creek. Next noted near Poigan Rapids, September 9. The following day a flock of about two hundred were seen flying about the woods and fields of the farm at the Long Portage.

36. AMERICAN CROSSBILL. *Loxia curvirostra minor*.—One male and two females or young were observed feeding on the ground in front of the Hudson's Bay Co. Post on Bear Island, Lake Temagami, August 30.

37. AMERICAN GOLDFINCH. *Astragalinus tristis*—I find a single entry for this species on September 5—Lady Evelyn Lake.

38. PINE SISKIN. *Spinus pinus*.—One seen at the Lady Evelyn Falls, September 4.

39. WHITE-THROATED SPARROW. *Zonotrichia albicollis*.—Everywhere common throughout the north. Conspicuously numerous about the farm, Long Portage, September 10, evidently migrating.

40. SLATE-COLORED JUNCO. *Junco hyemalis*.—Frequently noted throughout the region. Common at the confluence of the Montreal and Matabichouan Rivers, September 10.

41. SONG SPARROW. *Melospiza melodia melodia*.—Daily observed throughout the region.

42. FOX SPARROW. *Passerella iliaca*.—Only once observed—Long Portage, Lake Timiskaming, September 10.

43. CEDAR WAXWING. *Bombycilla cedrorum*.

—Three of this species were seen at Temagami Lake, August 31. Not again observed.

44. RED-EYED VIREO. *Vireosylva olivacea.*—Many heard on the Montreal River below Latchford, apparently absent elsewhere.

45. PHILADELPHIA VIREO. *Vireosylva philadelphica.*—Observed once on the shores of Temagami Lake, September 1, in company with Warblers and the next species.

46. BLUE-HEADED VIREO. *Lanivireo solitarius.*—Observed once only—morning of September 1, Lake Temagami. It was associating and apparently migrating with the Philadelphia Vireo, Black and White Warbler, Myrtle and Black-throated Green Warblers.

47. BLACK AND WHITE WARBLER. *Mniotilta varia.*—Observed but the one morning mentioned in the last entry.

48. BLACK-THROATED BLUE WARBLER. *Dendroica cærulescens.*—Saw a single individual in low shrubbery while making a portage below Latchford.

49. MYRTLE WARBLER. *Dendroica coronata.*—On the morning of September 3 this species was extremely common in the woods about Wakimika Lake. The Myrtles were in company with Redstarts and evidently migrating.

50. BLACK-THROATED GREEN WARBLER. *Dendroica virens.*—Record of six individuals in all of this species is entered in my journal. Four of these are for the morning of September 1, at Lake Temagami; the others were seen the following morning at Lake Ababika.

51. OVENBIRD. *Seiurus aurocapillus.*—Only two individuals seen; one on each of the mornings mentioned for the last species.

52. AMERICAN REDSTART. *Setophaga ruticilla.*—Two entries—September 3, Wakimika Lake, and the lower Montreal River, September 8.

53. AMERICAN PIPIT. *Anthus rubescens.*—A single individual seen on the rocky shores of the N.W. Arm of Lake Temagami, September 1. Several flocks, already migrating, were met with in the vicinity of Latchford, September 6.

54. WINTER WREN. *Nannus h. hiemalis.*—This delightful singer was first observed at the Ragged Chutes on the morning of September 7. The following morning I heard and saw another. Both birds were in full song.

55. WHITE-BREASTED NUTHATCH. *Sitta c. carolinensis.*—This species yields in frequency to the next. Observed on two or three occasions in the Temagami Reserve.

56. RED-BREASTED NUTHATCH. *Sitta canadensis.*—Tolerably common in the heavy timber throughout the entire region.

57. BLACK-CAPPED CHICKADEE. *Penthsiees a. atricapillus.*—Fairly common everywhere in the country. The Hudsonian Chickadee escaped us.

58. GOLDEN-CROWNED KINGLET. *Regulus s. satrapa.*—Observed on numerous occasions throughout the trip. They were very common in the conifers on the morning of September 11, at Lake Timiskaming.

59. RUBY-CROWNED KINGLET. *Regulus c. calendula.*—Observed three times during our week in the Temagami Reserve. Two individuals were seen among the Golden-crowns at Lake Timiskaming.

60. OLIVE-BACKED THRUSH. *Hylocichla usulata.*—A single bird of this species was observed near the summit of Beave Mountain on September 10.

61. AMERICAN ROBIN. *Planesticu m. migratorius.*—A single bird was seen near Temagami Station, but the species was not again met with until we drew into the hardwoods on the lower Montreal River. It became quite common at the farm on the Long Portage, Lake Timiskaming, September 11.

NOTES AND OBSERVATIONS

CHRISTMAS BIRD CENSUS AT LONDON, ONTARIO.—In *The Canadian Field-Naturalist*, Vol. 35, page 119, there appeared a list of birds observed by the McIlwraith Ornithological Club on their annual Christmas Census trips covering a period of eleven years. The present year (1922) plans were made to cover the country surrounding London as thoroughly as possible, and, with that end in view, a number of parties were organized (consisting for the most part of one or two observers each) with territory so arranged as not to overlap. The separate lists were combined into one, and the number of both species and individuals was so gratifying that it was thought perhaps the result might be of interest to the readers of *The Canadian Field-Naturalist* and it is therefore published here.

Weather conditions might be briefly stated as wind practically nil, ground snow-covered to a depth of three or four inches, temperature 9 a.m., 34°, 2 p.m., 44°; 5 p.m., 32°. Sky overcast and light bad in the morning, but clearing about noon and conditions ideal in the afternoon with a clear sky and the sun bright and warm. The census was taken Saturday, December 23rd, 1922.

American Golden-eye, 4; Ruffed Grouse, 1; Red-tailed Hawk, 3; Red-shouldered Hawk, 1; Long-eared Owl, 1; Screech Owl, 1; Great Horned Owl, 2; Snowy Owl, 1; Belted Kingfisher, 1; Hairy Woodpecker, 8; Downy Woodpecker, 22; Red-headed Woodpecker, 8; Red-bellied Woodpecker, 2; Flicker, 2; Blue Jay, 20; Crow, 48; Meadowlark, 7; Bronzed Grackle, 1; Purple Finch, 33; American Crossbill, 2; Goldfinch, 4; Pine Siskin, 101; Tree Sparrow, 37; Junco, 107; Song Sparrow, 6; Chewink, 2; Cardinal, 4; Mockingbird, 1; Winter Wren, 1; Brown Creeper, 4; White-breasted Nuthatch, 28; Black-capped Chickadee, 58; Golden-crowned Kinglet, 21. Total, 33 species; 542 individuals.

Chewink, two males, first seen (and heard calling) on December 2nd. This is the first winter record for some time.

Mockingbird. Has been living for about three weeks in and near the garden of one of the members of the Bird Club, where it feeds on the berries of the asparagus and *Ampelopsis Engelmannii*. No doubt it will remain as long as the berries last.

Red-headed and Red-bellied Woodpeckers are not infrequently found here in winter, but they were reported by several different observers, one of whom found five (if not more) Red-heads and one Red-belly in the same woods where the two Chewinks were living.

Meadowlarks are also reported nearly every winter, but seven in one flock is more than any of the club members ever saw in winter before. They were feeding in the middle of the road.

The Winter Wren was found in a little ravine where it dodged in and out amongst the tree roots, bobbing up and down in its characteristic manner. There is one other winter record, January 7th, 1911.

The Snowy Owl was about a mile south of the city and was being pestered by a flock of Crows who made much more noise than they usually do when the victim is a Great Horned Owl.

As far as northern birds are concerned the commonest this winter is the Pine Siskin. They have been here in good numbers since October. Both Crossbills have been reported once or twice, although the White-winged was missed on the census, while Redpolls, Grosbeaks and Northern Shrikes have not been seen at all. Snow Buntings were heard flying over one night about the middle of the month.

Amongst other species seen or heard recently are the American Merganser and Bob-white. One observer stated that if he could have visited his usual hunting ground he was fairly certain he could have added Short-eared Owl, Prairie Horned Lark, Snow Bunting, Red-breasted Nuthatch and Robin. It is too bad he could not have recorded these also and thereby have made the list a REAL one. Perhaps it is just as well, however, as the club will no doubt find difficulty in breaking the present record of thirty-three species, the best previous number being twenty-one.—E. M. S. DALE.

THE HAMILTON BIRD PROTECTION SOCIETY INC., REPORT OF THE ANNUAL CHRISTMAS BIRD CENSUS, DECEMBER 26, 1922.—South side of Dundas Marsh, fields and ravines between the Marsh and "The Mountain", edge and side of "The Mountain" between the Sanatorium and Albion Falls (about eight miles), from Albion Falls to Bartonville by way of the Red Hill and the Glendale Golf Course. Total distance, fifteen miles, observers on foot, in five parties. In the field four hours, nine a.m. to one p.m. (one party, one to five p.m.). Sky overcast, no wind; temperature, start 42°, finish 43°; ground lightly covered with snow.

Herring Gull	268
Ducks (sp? in flight)	2
Hairy Woodpecker	6
Downy Woodpecker	23
Flicker	1
Blue Jay	13
Crow	21
Purple Finch	20
Red Crossbill (1 flock)	7
Redpoll	4
Goldfinch	46
Pine Siskin	87
Snow Bunting	2
Tree Sparrow	119
Junco	78
Cedar Waxwing	12
Brown Creeper	9
White-breasted Nuthatch	13
Black-capped Chickadee	26
Golden-crowned Kinglet	28
Ruby-crowned Kinglet	3
Robin	2

Total: 22 species, 790 individuals.

REMARKS.—The presence of other species of Gulls besides Herring Gulls was suspected but not confirmed. Numbers of "Ducks" have been reported from the eastern end of Hamilton Harbour lately. Flickers have been seen at the feeding station of R. O. Merriman and by Dr. H. G. Arnott on the Toronto-Hamilton Highway, several miles from the territory covered by the census, on December 24. Meadowlarks were reported by Dr. Arnott at the same place and time. The two Snow Buntings were stragglers from a

large flock of birds which could not be approached closely enough for identification, perhaps also Snow Buntings. The Ruby-crowned Kinglets were identified by C. D. Cook among a small flock of Golden-crowned Kinglets. Three were clearly seen to be without the head marking of the Golden-crowned, and of these two were seen to have the ruby crown. Some of the others were seen to be Golden-crowned, and a few remained unidentified.—MRS. C. D. COOK, MRS. F. E MACLOGHLIN, MISSES MILLS, E. O. SMITH, JOHNSON, BAUER, JAMES, MESSRS. C. D. COOK, T. F. MCILWRAITH, JR.

CHRISTMAS BIRD CENSUS AT TORONTO, ONTARIO.—Christmas, 1922, in Toronto holds the record for mildness since 1895. The day dawned bright and clear, without a breath of wind. All through the morning the sun shone weakly and yet genially in the southern sky, but by noon a light filmy haze spread over the whole sky, which increased until the day became dull. The slight frosts of the previous night had kept some 2 inches of snow from melting, and had been severe enough to freeze over the streams in their smooth places.

It was an ideal day for bird study. We started early and by 8:30 were entering the Don Valley—that famous stretch of wooded hillside and flat pasture land through which flows the Don River and which has given Toronto many an interesting piece of wood-lore for several generations. Already we had heard a Downy Woodpecker in the city shade trees, but we *on'y* heard him. We knew we would see another later and did not stop. Our first observations came as we walked down the long icy road into the valley. Here we saw a small flock of Tree Sparrows among whom were two Juncos. Lively and active as ever they passed along through the bushes as we watched them. At the foot of the hill we found ourselves on the very edge of the river, and near one of its open spots. Here, to our surprise, we found an American Golden-eye sporting in the water There was no mistaking the black head and white spot as we watched the bird from the bank some 100 paces away. It occurred to me it might be wounded so I openly approached, but no, off it flew, following the river in a southerly direction. Golden-eyes are by no means rare in Toronto at this season; we see several on every visit to the lake shore.

Just now we distinctly heard a Kingfisher's well-known rattle, but he was far down the valley so that we did not see him. The bird's note is so well known and there was so much open water about that there was no doubt of the Kingfisher's presence though we failed to see him.

We followed the valley up for some distance, wondering which direction would be best to take; and I might say that we were somewhat dismayed to find the entire lower-lying parts becoming enveloped in a thick fog. We would willingly have stood greater cold to have it clear with an unobstructed view. To avoid this interference we climbed the hillside to higher ground and started to explore the mixed woods above. It was not long before we found a flock of Pine Siskins. Siskins have been very common throughout the fall. Very often flocks are seen flying hastily across the sky or feeding in the hemlocks.

But misfortune followed us even unto the Hill. The fog rose and became a thick grey wall in which the landscape was lost 100 yards away. I began to see our record list of Birds for the day vanish in the fog. Far away in the woods I could hear a noisy flock of Blue Jays. There was no doubt of that weird screech, but around were only the nearest trees and the omnipresent grey fog. Had every bird been as noisy as the Jays or even had each inhabitant of the woods given his own call we might have kept a sort of list of audible observation. But there are so many faint notes and so many silent birds now-a-days. So, though we knew well enough where we were going, we groped on through the fog and wished for a breeze that would clear the air.

Fortune smiled on us. The pale, wan December sun shone his best and silently as it came the obnoxious fog withdrew and an hour later the air was as clear as one would wish for observation. We came upon the Blue Jays—some eight of them. It was as we might have expected—they had gathered to worry some unhappy Owl. To all appearances it was a Great Horned Owl, judging by the size of the huge brown form that leapt from the limb and flapped away through the woods. The Saturday afternoon previous I had seen three of these Owls in the same woods and identified them through the field glasses. Might not this be one of those—a day or so later in the same locality? The Blue Jays! They all forsook him and fled, each going his own way in another direction and we saw them no more.

But now a familiar note caught our ears. *Yank! Yank!* We might have expected it sooner. The White-breasted Nuthatch—and with him two Chickadees, who responded as usual to my whistled call, coming close and allowing a good look at them. Here too we heard a long thin note, *zeep-zeep*, which puzzled us not only to recognize but to locate. Such lack of volume made it difficult for the ear to hear definitely. Again and

again it sounded but had not the Brown Creeper deliberately flown onto the tree trunk nearby we might never have known the truth.

Then, as if in contrast, came the rich free warble of a Purple Finch from a tree top in the woods nearby. He sang for several minutes, so that we easily found him. It was not his full song as in the spring, but just a few rich notes as though for a sample of what was to come. Later on we found a flock—some 18 or 20 individuals feeding on Yellow Birch Catkins and near them many Pine Siskins also feeding on the same food.

Here a loud tapping attracted us and, as we expected, we found a Downy Woodpecker busy on a tree trunk Our first Downy uttered his note, but this one was silent except, of course, for his tap-tapping.

I have remarked how mild a day it was. Nowhere did we realise it more than here, in this sheltered corner of the valley, open as it was to the south and the sun. Here we found a line of cedar posts that were positively warm to the touch and in one we discovered a nest of blue-bottle flies, nestled in a hole in the post. As we poked them, they crawled out upon the post—but very numbly. Later on we saw a gnat flying past. Strange sights these for a Canadian Christmas Day!

We now turned our steps, following the valley homeward, but by another way. It is always wise to cover as much country as possible, although one of the beauties of bird study is that you may happen to see other birds entirely different from the ones previously seen, though you retrace your steps exactly.

On our return we often saw flocks of Pine Siskins, occasionally more Purple Finches, and another Downy. One single Silent Crow flew over. We distinctly heard the familiar *Per-chic-o-ree* of the Goldfinch but failed to see him and as we passed by a hemlock grove we found 4 Golden-crowned Kinglets. Other very common birds we found were the Gulls. These were flying overhead constantly, up and down the valley, sometimes several together, occasionally many wheeling and turning in bewildering circles overhead. The secret of their frequenting this inland spot in such numbers is the fact that some one out here keeps a large hog "ranch". A great deal of the garbage gathered for hogfeed is left lying about on the open fields, and proves to be a great attraction to thousands of Gulls. At times I have seen many acres white with Gulls standing or feeding on refuse. Though I have studied these flocks very carefully through field glasses I have never been able to identify more than two species among them —the Herring and Ring-billed Gulls. So that today we felt safe in saying that our many Gulls that flew and circled overhead were only of these two species.

SUMMARY

Date—December 25, 1922.

Weathe —Very mild, sometimes foggy, at length dull.

Locality—Don Valley—East Branch, Toronto Ontario, op n wooded valley, hillside woods, and flat pastureland.

Wind—None.

Time—8.30 a.m. to 12.30 p.m.

Birds Recorded:—

1. TREE SPARROW.
2. GOLDEN-EYE.
3. JUNCO.
4. BELTED KINGFISHER. (Heard only).
5. PINE SISKIN.
6. NUTHATCH, WHITE-BREASTED.
7. CHICKADEE.
8. BROWN CREEPER.
9. PURPLE FINCH.
10. BLUE JAY.
11. GREAT HORNED OWL (?).
12. CROW.
13. DOWNY WOODPECKER.
14. GOLDEN-CROWNED KINGLET.
15. AMERICAN GOLDFINCH. (Heard only).
16. RING-BILLED GULL (?).
17. HERRING GULL (?).

JAMES BAILLIE.
STUART L. THOMPSON.

BIRDS OF OTTAWA, CHRISTMAS WEEK, 1922.—On the day preceding Chr stmas day, six parties composed of O.F.-N. C. members went on bird hikes in the vicinity of Ottawa, and two days later another party made observations. These seven parties covered practically all the country within a radius of from six to twelve miles of Ottawa. The individual areas covered may be designated in a general way as follows:—Rideau River, lower Ottawa river, Metcalfe road, Montreal road, Fairy lake, Que., Kirk's Ferry, Que. to Hull, Que., Aylmer, Que.

During the period above mentioned the temperature hovered around the freezing point, and the snow measured about five inches in depth.

The following list includes the birds observed by the hiking parties, and three additional species seen locally by single observers during Christmas week.

RUFFED GROUSE	Dec. 24	9
PIGEON HAWK		1
HAWK OWL	Dec. 24	1
HAIRY WOODPECKER	Dec. 24	7
DOWNY WOODPECKER	Dec. 24, 26	10

BLUE JAY	Dec. 24, 26	28
CROW	Dec. 24, 26	123
BRONZED GRACKLE	Dec. 25	1
PURPLE FINCH	Dec. 24, 26	36
AMERICAN CROSSBILL	Dec. 26	30
WHITE-WINGED CROSSBILL	Dec. 24	6
REDPOLL	Dec. 24	19
PINE SISKIN	Dec. 24, 26	1352
SNOW BUNTING	Dec. 24, 26	3
WHITE-THROATED SPARROW	Dec. 24	2
TREE SPARROW	Dec. 24	6
NORTHERN SHRIKE	Dec. 24	2
BROWN CREEPER	Dec. 24, 26	4
WHITE-BREASTED NUTHATCH	Dec. 24, 26	16
RED-BREASTED NUTHATCH	Dec. 24, 26	17
CHICKADEE	Dec. 24, 26	49
ROBIN	Dec. 24	1

The above list shows 22 species, totaling 1723 individuals. The Pigeon Hawk has been observed almost daily since October, in the yard of Mr. Geo. White, near the eastern boundary of the city. The Bronzed Grackle, which is the first recorded in winter, came to my yard several times on Christmas Day to feed on spilled poultry grain. The White-winged Crossbills were also observed by Mr. White, who saw them feeding on birch seeds. The White-throated Sparrows are the first Ottawa winter records.—CLYDE L. PATCH.

BLUE GEESE AT LAKE ST. CLAIR.—Mr. E. R. C Clarkson, of Toronto, took three specimens of the Blue Goose, *Chen cærulescens* (L.), on October 25, 1922, at St. Ann's Island, Lake St. Clair. Two of the specimens were presented to the Royal Ontario Museum of Zoology. Mr. Clarkson reports that a flock of approximately 500 geese spent about ten days feeding in shallow water in the neighborhood of St. Ann's Island. In this flock were perhaps fifty or more Blue Geese and about twenty-five Snow Geese, the rest being Canada Geese. Part of the flock, including a few Blue Geese, remained until about November 10.—J. R. DYMOND.

THE CAROLINA WREN (*Thryothorus ludovicianus*) AT HAMILTON, ONT.—On the morning of November 26th, 1922, in company with two members of our local bird society, we saw a bird which we identified as the Carolina Wren. It was scratching and feeding in the underbrush on the side of the Hamilton Mountain, occasionally flying a few feet from some small tree or bush to another one. We watched it for over half an hour at a distance of about twenty feet and identified it by its large size, about 5½ inches, its red-brown back, long bill, and prominent white marks over the eyeb ow. The tail was held erect over the body. This same bird was seen three weeks ago by one of my companions of last Sunday. As the Carolina Wren is so seldom found in Canada, Mr. R. O. Merriman, president of the Hamilton Bird Protection Society, has asked me to report it.

In addition to this bird we saw small flocks of Purple Finches, small flocks of Pine Siskins, a few Golden-crowned Kinglets, two Brown Creepers, two Pine Grosbeaks, one Downy Woodpecker; and one Robin. The glasses used were: one pair large field glasses Lemaire 21 ligne, one pair binoculars Heliolith 10x, and one pair field glasses Bausch Jena Special.—ANNA E. (MRS. F. E.) MACLOGHLIN.

CORRESPONDENCE

TO THE EDITOR OF
The Canadian Field-Naturalist,
Ottawa.

Dear Sir:

A budding controversy in connection with the bird-life of the wilderness is indicated by Mr. H. A. P. Smith's letter in a recent number of *The Canadian Field-Naturalist.*[1] It is hoped that Mr. Smith's letter will provoke a serious discussion of this question, for the popular conception seems to be that bird-life increases in variety of species and numbers of individuals as civilization is left behind and primitive conditions are reached. In the present writer's opinion the reverse of this holds good. To him wilderness and silence are synonymous terms. There are thousands of square miles of forest in British Columbia where one may walk from daylight to dark without seeing more than five or six species of birds. These areas are natural bird sanctuaries protected by their isolation, and the so-called "balance of nature" is not upset by man. There are no cats, few squirrels (the martens keep them down), no Crows, and the nest-robbing school boy with his slingshot, who is said to be "the chief destroyer of our passerine birds and other small non-edible birds generally" has never brought the tools of his craft into these solitudes. The small lakes, many of them rich in duck-feed, are tenanted by Loons only. They and the trout, to quote Mr. Arthur

[1] *The Canadian Field-Naturalist*, Vol. 36, page 18.

Cleveland Bent, "flourish together until the advent of the sportsman". Such are conditions in the wilderness forests of British Columbia before the homesteader and the sportsman disturb the equalized "balance of nature".—J. A. MUNRO.

Okanagan Landing, B.C.,
December 22nd, 1922.

BOOK REVIEW

SUCCESS IN PRAIRIE TREE PLANTING: by Norman M. Ross, Dominion Forestry Branch, Dept. of the Interior, 1922.

This is an attractive, illustrated booklet of 34 pages, published with the object of setting forth the possibilities of prairie tree planting, of reviewing the present system of co-operative tree planting, and of giving conclusions based on twenty years' experience with the present system.

In the period treated the practise of planting trees on the prairies has progressed from ridicule to reality. More than 60,000,000 seedlings and cuttings have been distributed by the Branch in this period, and the value of the resulting tree plantations is conservatively placed at $12,000.000.

Not the least interesting portion of the bulletin is that in which many farmers who have planted trees give the result of their experiences. Shelter for buildings, stock, and gardens; improvement in appearance of the home; stopping of drifting soil; shelter for insect-eating birds; and many other points are brought out by these correspondents. One suggestion given in these letters is that something might be done to encourage the planting of trees in school yards.

With the information now available it would seem possible to grow trees throughout most of the prairie region and there are great aesthetic and practical reasons for making the attempt wherever there is said to be chance for success.—H. L.

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CANADIAN STREAMS WITH SOME UNUSUAL FEATURES[1]

By E. M. KINDLE

IF a geologist were asked to name the two principal functions of mountain brooks he would probably mention the familiar work of collecting the contributions of ravines and smaller brooks and delivering them to another stream or to a lake. The less conspicuous but geologically very important work of slowly and persistently cutting down and removing the rocks over which it flows would doubtless be spoken of as the other great role played by brooks in the economy of nature. Stated briefly, brooks are ordinarily collectors but not distributors of surface waters and their chief geological function is to etch their channels slowly but steadily deeper into the earth's rocky ribs. All the ways of a brook, however, cannot be found out from observations of a limited number of streams.

Two brooks which have come under the writer's notice between them violate both these rules of behaviour which might be expected to govern the activities of all brooks. One of these divides its waters equally between two distinct drainage systems, while the other is engaged in building up its bed more rapidly than most streams are deepening their channels.



FIGURE 1.—View of Split brook looking downstream across the boulders on which the stream divides.

One of these streams, known by the significant name of Split brook, is located about eight miles west of Eganville, Ontario. The writer is indebted to Mr. G. Jarvis, a keen observer of brooks and rivers, for the opportunity to see this unusual stream.

Split brook gathers its waters from the northern margin of a cuesta of Pre-Cambrian rocks which rises nearly a thousand feet above a lowland which skirts its northeastern base. Clear Lake occupies a depression in this lowland.

[1]Published with the permission of the Director of the Geological Survey of Canada, Ottawa.

Split brook has cut a deep V-shaped notch through the rim of the cuesta, through which it descends to the lowland. Just at the point where the brook debouches on the lowland it encounters a large group of boulders on which it splits into two branches carrying nearly equal quantities of water. The left hand branch empties about a half-mile from its point of origin into Clear Lake, which is connected with the Bonnechère river valley. The right hand branch joins the Madawaska river drainage basin.

In order to get a clear understanding of the reason for the curious behaviour of this brook in dividing its waters between a river and a lake it is necessary to look back a little way into its history. If the biography of Split brook should ever be written, one of the last chapters would tell of a time when the waters of a lake many times larger than Clear Lake reached up the sides of the cuesta nearly 100 feet higher than the stream bed at the point where it splits. At that time Split brook entered the Pleistocene lake a short distance above the point where it now splits and the two forks had not then come into existence. It was during this stage of its development that the fine delta[2] was built, much of which still remains on the northwest side of the brook. As the Greater Clear lake of late Pleistocene times shrunk in size the brook cut through and removed much of the delta which it had built. In doing this a considerable number of boulders, too large to be moved by a small stream, which were originally built into the delta by floating ice, were left in the middle of its channel. These boulders, remnants of the dissected portion of the delta, have accumulated in the stream bed as a wedge-shaped mass against the point of which the brook has split. Sediment dumped on the bottom of the old lake as it retreated outside the boulder wedge built the lake bottom slightly higher than elsewhere along an axis running across an arm of the lake from this boulder mass. The brook itself thus built on the lake bottom, before its retreat had been completed, a shield-like divide scarcely perceptible to the eye, on which its waters split when the Pleistocene lake episode of its history came to an end.

The curious example of "Split brook" is duplicated by a river in Quebec. Mr. Harrison F. Lewis of the Canadian National Parks Branch informs the writer that a river in eastern Quebec called the Rivière Petit Mécatina divides its waters about ten miles from the coast between two channels, one of which continues nearly due south and the other nearly due east to the Gulf of St. Lawrence. The western channel has a length of about fifteen miles and is known as the River Netagamiou. At the falls a short distance from the coast this western channel is about 350 feet wide and the water drops 50 feet. The eastern channel also has one or more falls, so that the two terminal branches of the Mécatina do not represent any of the features of a delta. The roughly triangular area outlined by these two outlet channels and the Gulf of St. Lawrence is not the alluvial plane which the map might suggest, but a rugged rocky Pre-Cambrian area.[3]

This chronicle of the vagaries of three Canadian streams will conclude with a brief description of a warm water brook located in the Mackenzie river basin. It originates in a large warm spring on the northwest side of Rock-by-the-Riverside, a mountain ridge which is an outlying spur of the Franklin Mountains. This stream has cut a graded channel one-fifth of a mile long through the thick terrace of Pleistocene gravels which lies between the east bank of the Mackenzie and the mountain. Across the bottom of this channel it has built a series of miniature dams of calcareous tuff. These structures, resulting from the deposition of the calcareous content of the warm spring water as it cools, produce a series of long shallow pools. The sides and bottoms of these are lined with recently deposited calcium carbonate on which various species of algæ are growing. The crystal-clear pools of this stream, separated by a series of dams built by the mineral deposits from its own waters, set this brook apart in the writer's memory as one of the most unusual of brooks.

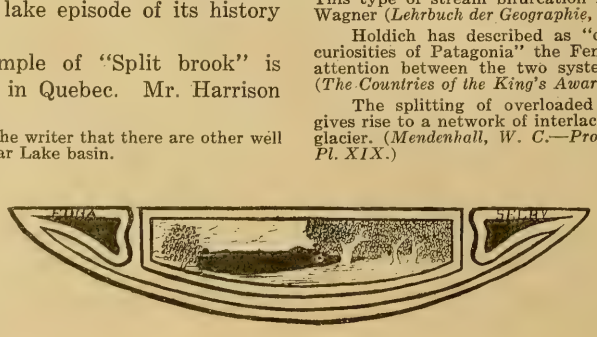
[2]Mr. J. Keele informs the writer that there are other well developed deltas in the Clear Lake basin.

[3]NOTE.—The writer's attention has been called to three or four other examples of streams which divide their waters.

Professor W. M. Davis, in his *Physical Geography* (p. 277) cites the case of Two Ocean creek in the Yellowstone Park. This type of stream bifurcation is also briefly discussed by Wagner (*Lehrbuch der Geographie, Bd. 1, p. 409*).

Holdich has described as "one of the great geological curiosities of Patagonia" the Fenix river which "divides its attention between the two systems, Atlantic and Pacific." (*The Countries of the King's Awards*, pp. *384-385*.)

The splitting of overloaded glacial streams sometimes gives rise to a network of interlacing streams below an active glacier. (*Mendenhall, W. C.—Prof. Paper U.S.G.S., No. 41, Pl. XIX.*)



THE ROCKY MOUNTAIN SHEEP (Ovis canadensis) IN BRITISH COLUMBIA

By ALLAN BROOKS

THE range of the Rocky Mountain Sheep or "bighorn" in British Columbia as given in the recently published book, *The Conservation of the Wild Life of Canada* (Hewitt, 1921, pp. 78-81), is found, according to the observations of the writer, to need considerable revision.

PRESENT RANGE (Brooks, 1922)[1]

1. Bridge river north to Chilcoten plateau, east to Fraser river, west to Chilco Lake.

2. Mountains south of Similkameen river, at one point north of Similkameen river near Hedley.

3. Mountains east of Vaseaux lake, north to Penticton, south to McIntyre (Sawmill) creek.

4. Shorts' creek (Biche river) west of Okanagan Lake.

5. Various points in Rocky Mountains north to 55°, probably 56°, or even further north. Very local, and absent from long stretches of this range.

FORMER RANGE

Forty years ago ranges 1, 2, 3, and 4 were more or less confluent wherever conditions suitable to sheep occurred. Sheep also extended along both sides of Okanagan lake and east of the Fraser river to near Clinton. It will be seen that the range of sheep in British Columbia was always very restricted. Most of the mountains of British Columbia are quite unsuitable for sheep, and none were ever found at any point in the Selkirk or Cariboo Mountains.[2]

HABITAT

An altogether mistaken idea persists that mountain sheep are confined to high altitudes. Even at the present day in British Columbia they may be found in the foothills down to 1000 feet where the ground is rugged enough, especially in late winter and spring. In the present year (1922) sheep, especially old rams, were seen as late as June regularly down to 1000 feet just east of Vaseaux lake.

VARIATION

The sheep of British Columbia have been split up into several subspecies. It is doubtful if any of these are warrantable. Even in such isolated colonies as that of Shorts' creek I have seen a large variation in horn patttern in both sexes, and the colour of adult animals ranges in this confined district from very dark (normal) to extremely light individuals. Of course in no part of its range in British Columbia is there any intergradation towards the very distinct sheep of the *Ovis dalli* type represented by the white *dalli* and the very dark *stonei* with all the intergradations between them.

ENEMIES AND DISEASES

The mountain sheep of the greater part of the dry interior were wiped out forty or fifty years ago by the introduction of rifles to the Indians and the introduction of domestic sheep to their range. Scab decimated the sheep of the region east of the Fraser river about 1870. A virulent disease that affects the heart and liver is now being introduced into the mountain sheep ranges Nos. 2 and 3 by domestic sheep that are brought over to graze from the state of Washington by sheep-herders. The government veterinary at Osoyoos is unable to determine this disease. Lumpy-jaw was very prevalent in the range of *Ovis dalli* and its subspecies (north side of Stikine river) up to 1908. but is now apparently stamped out. This disease never occurred in the ranges of *Ovis canadensis*(?). Ticks were very bad in 1897 and 1898. The ears of rams killed were packed to the drum with larval ticks, pale blue with sulphur-yellow legs. None were found in the ears of rams killed in 1902 and 1905.

Enemies other than man are principally cougars (mountain lions), coyotes, and golden eagles. These exist in large numbers on all the ranges, especially those on which no hunting is done. Coyotes, the large northern species, *Canis lestes* (Merriam), and Golden Eagles get, between them, at least seventy-five per cent. of all the lambs on two of the ranges on which I have had an opportunity to observe. This prohibits all possibility of any increase. The making of a sanctuary or the enactment of a perpetual close season must be accompanied by the appointment of a capable guardian to achieve any result.[3]

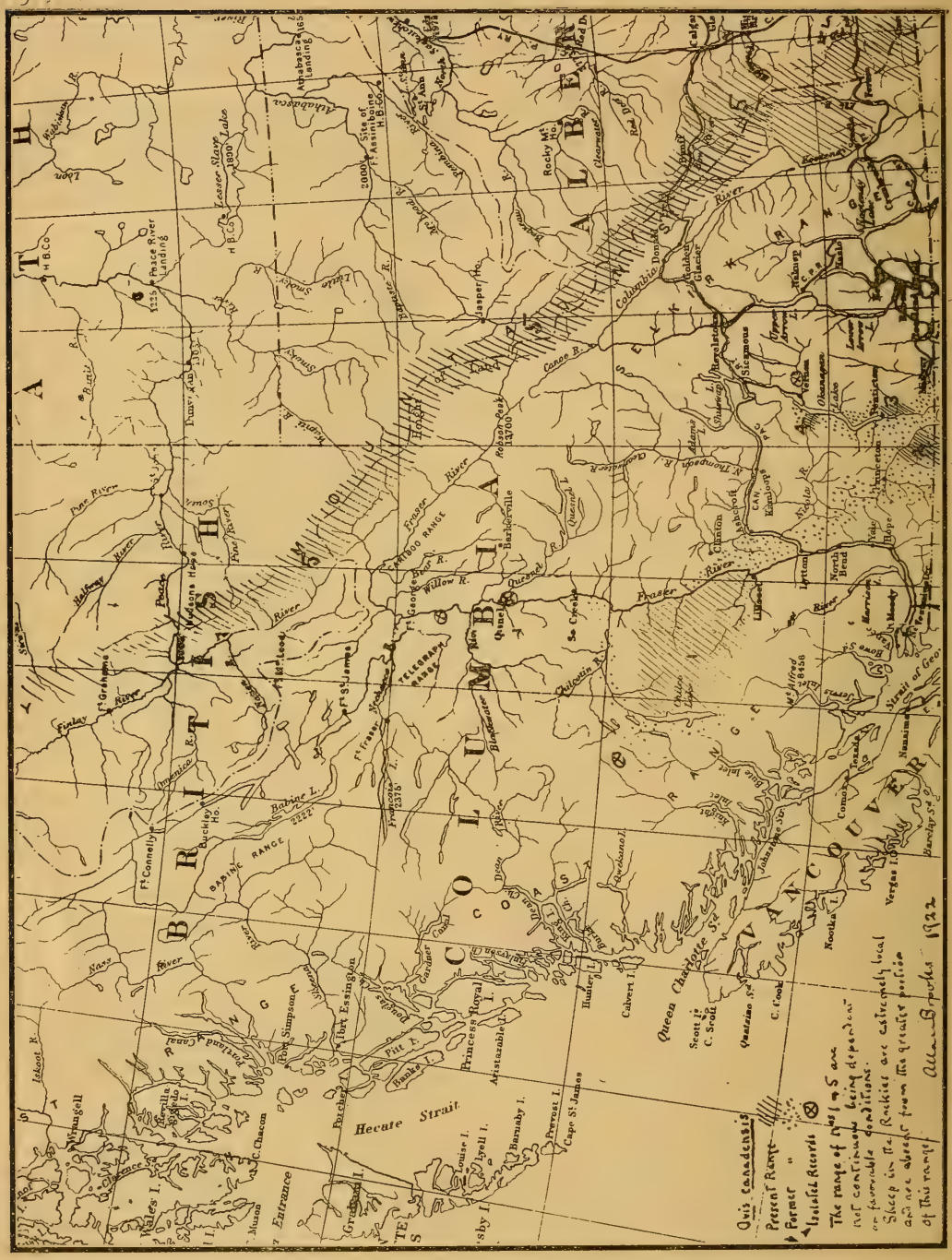
PROTECTION AND INCREASE

In ranges, 2, 3, and 4 the total cessation of any open season occurred in 1906 and has not been lifted since. The increase has been slight in range No. 2 and negligible in Nos. 3 and 4, with probably a decided decrease in the last range. The following suggestions for the protection of the

[1] See accompanying map.

[2] The often quoted record ram (now in the possession of W. F. Sheard of Tacoma) was killed in the Rockies and not in the Selkirks as everywhere quoted.—A. B.

[3] Vernon Bailey in his *Wild Animals of Glacier National Park, of northwestern Montana (Washington, 1918)* notes a similar destruction of mountain sheep, mountain goats, mule deer, and western white-tail deer in the park by coyotes and mountain lions, and repeatedly emphasizes the need of control of predatory species if the game animals are to increase in any park or sanctuary.—A. B.



Rocky mountain sheep in British Columbia are submitted:

1. The total prohibition of grazing permits for domestic sheep on any range inhabited by mountain sheep is imperative.

2. The appointment of a warden on each of the ranges 2, 3, and 4, and several wardens on ranges 1 and 5.

Such men must be good trappers and be resident on the range all the year. They must not be local stockmen or ranchers, but men whose entire time is devoted to the extermination of predatory

animals and birds as well as the enforcement of existing laws, especially as regards poaching by Indians. A salary of about $1200 or $1500 per year would be sufficient to induce the right sort of man to take the job, especially if he be allowed to trap fur-bearing animals and also to collect bounties on the animals and birds he kills.

THE AMERICAN MAGPIE IN MANITOBA

By NORMAN CRIDDLE

PREVIOUS to 1920 the Magpie was considered a rare resident in Manitoba, being more casual in its appearance than otherwise; it had, however, been observed in fair numbers in southern districts from time to time by early settlers and on a few occasions nests were discovered.

In the fall of 1921 Magpies invaded the province in much larger numbers than usual and as a result they were met with at least as far north as Dauphin and east beyond Winnipeg. At my home near Treesbank the birds were in daily attendance around the farm yard, where they picked up any article of diet available, the dust heaps being especially attractive to them. A similar bunch of visitants was present at most of the farms where trees afforded shelter and many found their way into the hands of taxidermists.

Judging from the personal evidence available I should say that Magpie's prefer the semi-wooded or broken lands for breeding places. River flats surrounded by prairie, or valleys bordered by high hills, seem to afford them the situations they desire most. The birds, for instance, seldom if ever, breed in the woods near my home, yet I found them to be nesting freely at Estevan, Sask., amid the fringe of mixed woods bordering the Souris river. In a similar way they were common summer residents in the foothills south-west of Calgary in Alberta, where I found several nests in low willow bushes.

As known to me the Magpie is a bird of shyness when man is concerned but one of great audacity in relation to other animals, They have a suspicion of man just as the Crow has, but may be tamed with patience. They move about among cattle, on the other hand, with absolute fearlessness, at one time hopping among them, at others resting upon the animals' backs. It is interesting to see their freedom in making themselves at home among the live stock and it leads one to suspect that the same antics were performed amid the buffalo in former days and possibly among the deer too. They have all the dislike of their relations, the Crow and Jays, for Hawks and Owls, which they mob with similar persistency. Naturally cats come in for their share of abuse, while coyotes are sometimes followed for a considerable distance, possibly with the idea of securing the leavings from the wolf's feast. My observations on most of these points, however, are of a casual nature and might doubtless be greatly enlarged upon by observers who have lived where the bird is a more permanent resident.

The Magpie appears to be almost omnivorous in its food habits. Nearly any thing from vegetable to animal matter is eaten. Berries, grain, meat, insects, eggs and young birds are among the food known to be consumed and the birds have been condemned severely for their bird-destroying activities. I am not prepared to discuss this question. It may be over-rated, as similar ones have been through prejudice; on the other hand, the destruction done may be all that is claimed. An interesting point in the birds' food habits that has recently come to the fore is the injury to live stock. We have very few records of this in Canada but one that has been related to me by my brother, Stuart, seems well worthy of note. He wrote under date of February 24, 1922, as follows:

"We have a fine lot of Magpies here (Treesbank, Man.) this winter, six or seven of them have used the cattle shed as a sleeping place, resting on the animals' backs over night. They have also been seen constantly skipping about on the cattle during the day time. I have kept a very close watch on their movements and last week noticed that one of the cows had a sore near the base of her tail, originated, I think, by the skin having been knocked off by accident. The Magpies had also noted the injury, and within two days enlarged the wound until it was fully two inches across and half an inch deep, besides which the surrounding flesh and skin were much swollen. I at once begun to treat the sore and filled it with cotton wool, which the Magpies promptly pulled out as soon as my back was turned. They then proceeded to further enlarge the wound. Curiously enough the birds seemed to be so gentle that the cow took no notice of them, indeed she seemed to rather like their attention than otherwise.

"As the Magpies are handsome birds and interesting I had devoted considerable time to an

attempt to tame them, this eventually resulting in my being able to approach to within a few feet. I thought, therefore, that it would be an easy matter to shoot one or two and frighten the others away, but this proved to be far from the case. I no sooner approached with a gun than the birds vanished, to return soon after my back was turned. I then set several traps, baiting them with rabbits' flesh, and to date have caught five birds, a sixth escaping from the trap. The others still come to the cattle shed but they have made no further effort to attack the injured cow. Had they been left unmolested, however, I am convinced that they would have been the means of killing the animal."

It is possible that the obnoxious habit of attacking wounded cattle may be confined to a few birds but, as the Magpies are very fond of resting upon the animals' backs, it is not surprising that they should enlarge any wound present. It is quite possible that such a habit might eventually lead to an attack upon a perfectly healthy animal, but there is little evidence to support such a supposition at present. We need further data on the subject, however, and it is to be hoped that our field naturalists will be on the watch to supply it.

OBSERVATIONS ON THE WINTERING FLOCKS OF CANADA GEESE IN NOVA SCOTIA

By HOYES LLOYD

IN February, 1921, I visited the "Goose Harbours" of Nova Scotia to make investigations relating to the great flocks of Canada Geese, *Branta canadensis canadensis*, which winter there. The chief wintering resort of the Geese is in three or four bays which are located on the Atlantic Coast, and in the southwestern portion of the Province. The most important of these bays are certainly Port Joli and Port l'Hebert, although the estuary of Sable River nearby is reported to be frequented by the birds to a limited extent. A flock of considerable size was wintering this year at Barrington Bay as well.

Mr. Bernard Cummings, who lives at Port Joli, was my host, and I am indebted to him and to other residents as well as to sportsmen who have visited the locality for much valuable information concerning the Geese.

The Geese arrive at the wintering ground during the late fall, the time varying with the season. Most of the birds that come appear to remain on these harbours until March. Mr. H. A. P. Smith tells me he has never found any food other than eel grass roots in the crops of birds taken here. The birds prefer to wash these in water and so their feeding time is controlled by the tides to a considerable extent. When sand is required they make a special trip to a sandbar for the purpose of securing it. Of course numbers of wounded birds are found apart from the flock and they will take almost any available food.

The Province forbids the shooting of Geese on the waters of the harbours even in the open season, and this has undoubtedly prevented the scattering of the winter flocks, although the Geese frequented these harbours in numbers long before such restrictions were thought of, in all probability. The two bays, Port Joli and Port l'Herbert, are largely surrounded by forests and they are separated by a high hill—the "goose hill" of Port Joli. The hunters do almost all their Goose shooting from this hill, over which the flocks of Geese fly when passing from one harbour to the other as is their custom. I was told that the birds prefer to feed when the water is at a certain depth, which is no doubt true. Now because of the conformation of the coast the tide at Port l'Hebert is said to be one hour later than at Port Joli. Local observers reported that the birds feed on eel grass roots in Port Joli harbour until the rising tide makes this no longer possible, and then fly across to Port l'Hebert there to continue their meal until again interrupted by the rising tide. While my observations did not confirm this, being restricted to four days, it is quite plausible and is of interest in conjunction with another report to the effect that the Geese do not commonly travel betwen these two harbours until the wintering birds have been on the harbours for several weeks. It is probable that the newly arrived migrants in fall find abundant food, and no doubt the drain made upon this supply by thousands of Geese is considerable. They would take the most accessible food first and then it might become necessary for the flocks to move about locally and take every advantage of change in water-level over the beds of eel grass so as to secure sufficient food. As the winter advances and the days grow longer there is no doubt that the flocks indicate their restlessness by flights from one harbour to the next, back and forth, and this must account for a con-

siderable part of the flights even if the food question has some bearing on the matter.

On my first morning at Port Joli, February 24, 1921, the thousands of Canada Geese drifting up and down the harbour with every shift of current and tide, rising leisurely to the proper altitude that the wind and weather demanded for the crossing to the next harbour, travelling up and down Port Joli itself, and always calling, now singly, now with a distant murmur from a thousand throats, and yet again with a raucous babbling, made a combination of sight and sound to thrill the most casual observer. Night and day the residents of these harbours are never out of sound of the Geese from the time the big flocks come in from the North until they depart again in the spring. With two other observers the day was spent in a study of the birds on the harbour. We practised counting Geese, too, and it was a pleasure to find that this could be done with considerable accuracy, as shown by independent counts made by different observers. About one thousand Black Ducks were found on the harbour this day, as well as American Golden-eyes, a few Buffleheads, and some Herring Gulls. Two Bald-headed Eagles were observed as well.

The morning dawned clear and cold on February 25th and H. A. P. Smith and I made the trip to Port l'Hebert on snowshoes. The majority of the Port Joli-Port l'Hebert flock was spending the day there, great patches of the harbour being black with the birds when we came to the edge of the woods, after our cross-country walk. When this flock was approached by two persons dressed in dark clothing the birds flew when the men were about half a mile from them. We counted the birds on this harbour while J. L. DeVany was counting the ones at Port Joli. A summary of all Goose counts is given at the close of this article.

On February 26th great numbers of the birds crossed to Port l'Hebert during the morning, as many as ten flocks being seen in the air at once. R. W. Tufts arrived at noon and reported the number of Geese that he had found at Barrington Bay that morning. This flock appears to be distinct from the Port Joli one. On the 25th and 26th the following birds other than Geese were noted on the harbours: 2 American Mergansers, 300 American Scaup, 75 and 250 American Golden-eyes, Black Ducks as noted, 100 Herring Gulls, 2 Great Black-backed Gulls, and some Kittiwakes.

On February 27th R. W. Tufts and J. L. DeVany snow-shoed to Port l'Hebert to count the Geese there while H. A. P. Smith and I counted the birds at Port Joli, still following the plan we began with in having all counts made independently by at least two observers, when this was feasible. A very marked flight to Port l'Hebert occurred this morning.

Many reports of the number of Canada Geese in this Port Joli-Port l'Hebert flock have been made, some of which are certainly fabulous. One observer placed the number at 3,000, while others report from 100,000 to 500,000 birds in the flock. Two persons who were familiar with the number of birds in past years were asked to compare the present numbers with those they had found previously, and they both said that there were more birds on the harbours now than they had seen before, while another thought the number was about the same. This is mentioned to show that we did not make our count at a time when the resident flock was depleted from any cause. It was important to determine the number of wintering birds as accurately as possible in view of the great divergence of opinion on this point.

By a preliminary check it was found that Messrs. H. A. P. Smith, J. L. DeVany, and I could count 5,000 Geese with a maximum variation between extremes of 20%. This was done by dividing the harbour into arbitrary sections and each making an independent count of the birds in the sections. All observers were equipped with binoculars x6. In view of the constant interchange of birds between Port Joli and Port l'Hebert it was necessary to make simultaneous counts at these two places. The Sable River birds were not counted, but this flock is not believed to be a large one. Counts were made at Barrington Bay, however.

A brief summary of the counts follows:

February 25, 1921—	
Port l'Hebert,	
H. A. P. Smith and Hoyes Lloyd	4,750
Port Joli,	
J. L. DeVany	1,000
Total	5,750
February 27, 1921—	
Port l'Hebert,	
R. W. Tufts and J. L. DeVany	3,300
Port Joli,	
H. A. P. Smith and Hoyes Lloyd	3,150
Total	6,450
Average	6,100
Barrington Bay—	
February 23, 1921, C. B. Day	1,700
February 23, 1921, Fred Hogg	2,000
February 26, 1921, R. W. Tufts	2,000
Average	1 900
Port l'Hebert, Port Joli and Barrington Bay—Total	8,000

At this point attention should be called to an account of the manner in which these birds secure fresh water to drink, as related by Mr. H. A. P. Smith. This will be found included in Mr. P. A. Taverner's article, "Adventures with the Canada Goose," *The Canadian Field-Naturalist*, Vol. XXXVI, No. 5, p. 83.

Our banding operations were not a success, although Mr. Smith did manage to secure and band one bird after very strenuous endeavours. Lest the mere count of these birds misrepresent the situation to some, let me add that this magnificent flock of birds has to be seen at home amid its snow-covered, forest-clad hills to be really appreciated.

A few birds that had been taken for the Biological Survey at Washington were examined by me in the flesh and I have based my subspecific determination on these specimens. This has recently been confirmed by Dr. E. W. Nelson, Chief of the Biological Survey. Some of these birds were not with the main flock, were not in prime condition of flesh, and neither stomach analyses nor weights could consequently be considered normal. The weights of the birds taken at this point vary from 9 to 18 pounds when in prime condition. The eighteen-pound bird was taken by Mr. H. A. P. Smith at Barrington on February 27, 1911, and he has written an account of the capture in *Forest and Stream* of April 14, 1913. Some time after this John Smith of Baccaro shot a fifteen-pound goose; and Mr. H. A. P. Smith shot another fifteen-pounder at Barrington in 1913. The biggest Goose secured by W. MacDonald, of Milton, weighed seventeen pounds. From H. A. P. Smith's reports I should consider that birds weighing more than twelve pounds were uncommon, while the minimum weight would be about eight pounds and the average about ten pounds.

In addition to those already mentioned, the following land birds were noted during my stay: Ruffed Grouse; Hairy Woodpecker; Canada Jay; Crow; White-winged Crossbill; Junco; 6 Myrtle Warblers, in a little flock near Port Mouton on February 28th; Chickadee; Brown-headed Chickadee (subsp. ?); Golden-crowned Kinglet; and Robin.

THE FIRST FIFTY YEARS OF THE ARNOLD ARBORETUM

By M. O. MALTE

IN the *Journal of the Arnold Arboretum*, Vol. III, No. 3, 1923, pp. 127-171, appears a paper under the above title by C. S. Sargent. The following synopsis of this paper is published here, in the belief that it will be of interest to the readers of *The Canadian Field-Naturalist*.

In 1868, James Arnold, a merchant of New Bedford, Mass., willed one-fourth of the twenty-four parts into which he divided his residuary estate to three trustees, to be applied by them "for the promotion of Agricultural, or Horticultural improvements, or other Philosophical, or Philanthropic purposes at their discretion, and to provide for the continuance of this Trust hereafter to such persons, and on such conditions as they, or a majority of them, may deem proper, to carry out the intention of the donor". Two of the trustees being much interested in the study of trees, the idea of creating a scientific station for the study and cultivation of trees was conceived, and on March 29, 1872, about two years and four months after the death of Mr. Arnold, the said trustees and the President and Fellows of Harvard College signed an indenture by which it was agreed to establish and maintain, under the direction and control of the President and Fellows of Harvard College, "an Arboretum, to be called the *Arnold Arboretum*, which shall contain, as far as is practicable, all the trees, shrubs and herbaceous plants, either indigenous or exotic, which can be raised in the open air at . . . West Roxbury . . .".

By this indenture Harvard College received as an Endowment for the proposed Arboretum $103,847.57 and agreed to use for it about one-hundred and twenty-five acres of the so-called Bussey estate which previously had been willed to the College by Mr. Benjamin Bussey, late of Roxbury. Subsequently, or, to be precise, in the year 1882, an agreement was drawn up between the City of Boston and the President and Fellows of Harvard College to the effect that the section of the Bussey estate which was to be devoted to the Arnold Arboretum was to be used, with certain restrictions, as one of the Boston parks. By this agreement the location of the Arboretum became practically fixed for a very long time to come. It soon became evident, however, that the land originally set aside for the Arboretum was insufficient if the Arboretum was to fulfill its purpose creditably, and consequently neighboring estates were secured and added to it. At present the Arboretum occupies approximately two hundred and fifty acres.

A few trees had been planted before 1882 but it was not until 1885 that it was possible to begin

planting systematically. The trees are arranged in family groups according to their botanical affinity, the genera of each family and the species of each genus being placed together. Access to each group is made easy through numerous grass-covered paths several miles in length, and, in order to make it possible for visitors easily to secure a comprehensive idea of the trees and of their relation to each other, a representative of almost every genus is found near a drive. Hardy shrubs of genera in which there are no trees are arranged in the same botanical sequence as are the trees, in parallel beds ten feet wide, with a total length of nearly 7800 feet. Shrubs belonging to genera and families in which there are trees are arranged in groups as close as possible to the trees of the same genus or family. In addition, large numbers of principally native shrubs have been planted as borders along the roads and to form undergrowth among the trees.

It is estimated that at present there are between five and six thousand species and varieties of trees and shrubs growing in the Arboretum. Of particular interest is the collection of the hawthorns which have been brought together from every State of the American Union and every Province of the Dominion of Canada. Seven hundred and thirty-five species and varieties of hawthorns are to be found in the Arboretum. Concerning the trees and shrubs in general it is interesting to note that all of them are from the northern hemisphere, as none from the southern hemisphere, not even from the Andes, southern Chile, or the higher mountains of New Zealand, have proven hardy.

In order to facilitate the correct determination of the trees and shrubs grown in the Arboretum, and in order to make the dendrological studies in general as successful and profitable as possible, a herbarium, confined to specimens of trees, shrubs, and suffrutescent plants, is kept. At present this herbarium holds about two hundred thousand sheets, representing the ligneous flora of almost every country in the world, together with a large number of fruits. A special effort is being made to demonstrate the range of variation in the more important trees and, accordingly, some species are represented in the herbarium by from one to three hundred sheets, Special attention should also be called to the large number of type specimens which the herbarium contains. In it are found the types of nearly all the new Chinese species published by the Arboretum in *Plantæ Wilsonianæ*, the new species published in *Garden and Forest*, in *Trees and Shrubs*, and in the *Journal of the Arnold Arboretum*, and of the new species of *Cratægus*, *Carya*, *Quercus*, *Tilia*, *Aesculus*, and other genera, published by the Director.

Needless to say, the importance of an adequate library in connection with the Arboretum was realized from the beginning. The library was started in 1873 and has gradually grown to a size that the Arboretum may justly feel proud of. It holds 35,500 bound volumes and 8000 pamphlets. It contains the books in all editions and languages devoted to the description of trees, and its collection of floras and monographs of genera in which trees and shrubs are described is a large one. On the whole, the library is managed on the principle that it should contain, in the first place, "all books relating to woody plants with the exception of those which are more valuable in a purely horticultural library." Little attention has therefore been paid so far to works dealing with practical horticulture or with physiology, entomology and the like. The importance of such works is, however, realized and they will in time, when circumstances permit, find a place in the library. The Arboretum possesses an exceedingly valuable collection of periodicals, including a large number of complete sets of rare ones which are now discontinued; and it receives regularly some three hundred periodicals more or less devoted to trees and their cultivation. A large number of rare old volumes are also found in the library, "and it is believed that outside the walls of the British Museum there is not a more complete collection of the books relating to plants published in the fifteenth and sixteenth centuries."

The Arboretum also has accumulated a large collection of photographs, containing nine thousand six hundred pictures of trees and shrubs, types of vegetation, gardens and scenery. These photographs have proven to be an important and very useful addition to the library as well as to the herbarium.

In the foregoing paragraphs a brief resumé has been given of the salient features in the history of the Arnold Arboretum, its development, and its resources, in the matter of collections and library, for dendrological investigations and research, as set forth in "*The First Fifty Years of the Arnold Arboretum.*" A few words may be added pertaining to some of the outstanding results of the activities of the Arboretum.

It should, in this connection, be recalled that, generally speaking, the Arboretum is a museum established and developed for the purpose of increasing the knowledge of trees and other woody plants, native as well as foreign. In order to secure the necessary material for the gaining of such knowledge officers and agents of the Arboretum have explored and are still exploring the

forests of North America; they have visited every country of Europe, the greater parts of Asia, Africa, Australia, and Central and South America. One of the results of these journeys is the introduction into the United States of an imposing list of species, nearly 1400 of which have been first introduced through the agency of the Arboretum.

The living dendrological material accumulated in the Arboretum is, as stated above, conveniently arranged for examination and study, in accordance with the object of the Arboretum to be "a station for the study of trees as individuals in their scientific relations, economic properties and cultural requirements and possibilities." It should be understood, however, that the Arboretum is neither a school of forestry nor a school of landscape gardening, although much information relative to forestry and to the principles of landscape gardening is gathered there and disseminated to the public. The Arboretum is fundamentally an investigational institution concerning itself with the promotion of the study and scientific knowledge of the trees and shrubs of the world, and as such it is an institution of great international importance. This fact is clearly demonstrated by the character and scope of its magnificent publications, viz.: *The Bradley Bibliography, The Pines of Mexico, A Monograph of the Genus Pinus, The Plantæ Wilsonianæ, The Cherries of Japan, The Conifers and Taxads of Japan, A Monograph of Azaleas, Bulletin of Popular Information, Journal of the Arnold Arboretum, Illustrated Guide to the Arnold Arboretum.* Besides these a number of works prepared by the Arboretum have been published elsewhere, for instance, *Report on the Forests of North America, The Woods of the United States, The Silva of North America, Trees and Shrubs, Garden and Forest*, etc.

NOTES AND OBSERVATIONS

Subscriptions for 1923 are now due; by paying promptly you will aid greatly in the efficient publishing of the magazine.

NEST BUILDING OF THE VESPA.—I had a wonderful wasp's nest on one of the windows at the "Ark" this summer. When Mr. Cassels took off the outside shutter the little BELL was exposed, so I just left it there and it proved one of the great attractions all summer and about 160 people came to see it. The nest was attached to the wood dividing the panes and instead of constructing a full nest, they just made half a one, so that, standing in the room, one could see all the workings inside. Feeding the grubs—greedy things—carrying out refuse and dead insects—making the paper, etc., etc. It was all perfectly wonderful. By the time the nest was finished it had twenty-one layers of paper and we watched them constructing the whole thing. A slight tap on the glass sent them out in scores and their beating on the panes sounded like a heavy rain. Just above the window, on the peak of the gable, was another huge nest, but they never appeared to bother each other. It was most depressing to watch them when the work was finished and cooler weather arrived. They would not respond to tappings on the panes and crawled about feebly, brushing their antennæ and looking so abjectly miserable that I truly could have wept. Worst of all, I had to put out pickle bottles with syrup and water in them at the kitchen door to catch them, as I could not step outside, but they would crawl all over me, especially if I had been handling fruit or meat, and would come into the kitchen and get into the food, etc. So, in self-defence, I had to hurry their departure. To their credit be it said I was never stung once, although I several times saw dogs, etc., beat a hasty retreat if they ventured too near this special window. I never tired of watching the paper-makers. How particular they were to get it of just the proper thickness and how they would go over it again and again, sometimes seven or eight times—biting it to the proper thickness. The pellet of pulp they brought would spread about three-fourths of an inch, and it was amazing how that nest grew, and how they made room for a fresh tier of cells. They do not waste much, do they? I sliced the nest off the window before the shutter went up again and that is all I have to remind me of the yellow-jackets.—ELSIE CASSELS.

SONG SPARROW WINTERING IN THE MONTREAL DISTRICT.—While snowshoeing about the margin of a cat-tail marsh, near St. Lambert, on January 14th, 1923, I was astonished to see two Song Sparrows fly from a clump of cat-tails and disappear amongst some small bushes fringing the bank of a stream that was still partly open and which, I later observed, had its source in the hot water discharge pipe of a nearby railroad shop.

Gradually both birds hopped into view, in the usual dilettante, look-before-you-leap manner of this species. I again watched them as they flew, when the wavering, near-to-earth flight, and the downward flip of the tail, gave unmistakable evidence of the birds' identity, were further evidence needed.

On January 28th I revisited this locality and had barely reached the fountain-head of the stream—a veritable hot spring—when a Song Sparrow took wing from the cat-tails about the margin.

It was apparent that the continuous flow of hot water was responsible for the unusual occurrence. The stream banks were almost free of snow and ice for a short distance, which no doubt enabled the birds to secure sufficient food, as they appeared quite active and contented, although the thermometer registered below zero.

The Song Sparrow is apparently somewhat of a slave to custom, even more so than many species. Almost wholly a ground feeder, it appears to ignore seeds adhering to bushes and trees—a fact that tends to keep it under cover, and that may have a bearing on its abundance and wide distribution.

I know of no other record of this species occurring in the Montreal District during the months of December, January, or February, and it is therefore significant that it should be found in the only spot in the district that is at all suitable as a winter habitat.—L. McI. TERRILL.

Cassiope tetragona (L.) DON. IN BRITISH COLUMBIA.—I observe that J. Dewey Soper in "*The Canadian Field-Naturalist*," November, 1922, quotes a statement that the finding of *Cassiope tetragona* in Rocky Pass, Western Alberta. has "brought the southern limit of this northern plant a long way south."

This species is recorded by F. K. Butters, in *Minnesota Botanical Studies*, 15th March, 1914, as having been found at 6500 feet in the Selkirk Mountains near Glacier. It is recorded in Britton and Brown, Vol. 2, page 686, as found in Oregon.

In Howell's *Flora of Oregon*, 1903, p. 419, it is recorded for the Cascade mountains in Oregon but no record is given of the altitude at which it is found in that region.

There is no doubt that this species is more common in the north than in the south, but at one time in the development of the vegetation of this continent *Cassiope tetragona* and many other so-called northern plants were common inhabitants of the lowlands. As the climate became warmer and the ice receded, other plants came in and, through competition, crushed them out, or drove them up into the higher altitudes or latitudes. On many of our mountains in British Columbia we find these plants stranded between timber-line and the perpetual snow line with a zone of subalpine vegetation gradually encroaching on them. If the mountains are of a sufficiently high altitude *Cassiope teragona* will climb higher; the altitude at which it is found depending largely on the latitude of the mountain and to some extent on the precipitation in that district.

Specimens in the University of British Columbia, Provincial Herbarium, are from:

Near Lake Atlin, B.C.—altitude 2000-3000 feet.

Headwaters Stikine, Nass, and Skeena, B.C.—altitude 5000 feet.

Moose and Goat Mts., near Pelly Creek, B.C., and Bad Luck Mountain, Ingenika River, B.C.—altitude 6000 feet.

The specimens found by Prof. Butters on the Selkirks were at an altitude of between 6000 and 6500 feet. This would suggest that they were found a little farther north than those collected by Mr. Soper, but without a knowledge of the precipitation in the Rocky Pass district and without information as to the latitude and longitude it is difficult to say with certainty what region may be claimed as the OLDEST CANADIAN HOME of *Cassiope tetragona*. This I think is a better way of putting it, than by speaking of "its southern limits" as if it were now spreading south. As to their southern limit of migration in the preglacial period we know little; some northern plants went beyond the equatorial line and their descendants are thriving south of the equator. Seeing that during the ice-age all *Cassiope* was wiped out in the north, the present northern plants have not occupied that territory so long as have the plants of the same species now found in Oregon. Prof. Butters' specimens were found near Mt. Sir Sandford (alt. 11,590 ft.) Lat. 51° 39″, Long. 117° 52″.—JOHN DAVIDSON.

EDITOR'S NOTE.—The statement quoted by Mr. Soper in *The Canadian Field-Naturalist*, November, 1922, reads in full: "Concerning No. 673, I am glad to state that you have brought the southern limit of this northern plant a long way south. We have *Cassiope tetragona* in our herbarium from numerous places in the far north, the most southern locality, however, being from the Yukon district." The statement could, no doubt, have been more happily worded. It was, however, the writer's intention to convey the idea that the contribution of *Cassiope tetragona* from Alberta to the National Herbarium at Ottawa was considered a very valuable one, inasmuch as the herbarium so far had no specimens from any locality south of the Yukon Territory.—M.O.M.

TWO ANONYMOUS PAMPHLETS ON ANTICOSTI.—The bibliography of the natural history of the island of Anticosti is not extensive. Mr. Harrison F. Lewis has called my attention to a pamphlet of thirty-nine pages, in the library of the Geological Survey, Ottawa, entitled "The Settler and

Sportsman in Anticosti," London, 1885, printed by Morris & Company, but without an author's name. Mr. Lewis states that the pamphlet contains a "List of the Principal Wild Fowl that Breed on Anticosti," and quotes instances that show the list to be unreliable, if not wholly imaginary.

I have in my library another pamphlet of the same origin as the first, entitled "Brief Notes on the Island of Anticosti, in the Gulf of St. Lawrence, Dominion of Canada," 1886, printed by Geo. Smythe & Company (London). This little pamphlet of eight pages is really a guide to an Anticosti exhibit at the Colonial and Indian Exhibition held in London in 1886, and contains a brief catalogue of the exhibits, and, though anonymous like the first, it states in a footnote "The Birds and Animals modelled, and the Exhibit designed and arranged by Rowland Ward, D.L.S., 166 Piccadilly, W." As I remember the exhibit of which the second pamphlet is the catalogue it consisted of a collection of grains, models of vegetables, samples of woods, a few stuffed animals, and a heterogeneous collection of birds that in all probability had been secured in London for the purpose of the exhibit, which was a private venture, and not part of the official Canadian exhibit.

While these pamphlets are no doubt quotable in bibliography they are not based on authentic material, and should not be used when writing of the fauna of Anticosti.—J. H. FLEMING.

A Round Table Conference of Federal and Provincial game officials was held at Ottawa on December 6th, 7th, and 8th, 1922, under the auspices of the Canadian National Parks. It is the first convention of its kind ever held in Canada

The proceedings of the Conference were marked by a splendid willingness to co-operate, and all the resolutions adopted were adopted unanimously. These resolutions, many of which deal with important matters relating to wild life conservation, are too voluminous for publication in *The Canadian Field-Naturalist*, but copies of them may be obtained upon application from the Commissioner of Canadian National Parks, Ottawa.

BOOK REVIEW

BIRDS AND MAMMALS OF THE STIKINE RIVER REGION OF NORTHERN BRITISH COLUMBIA AND SOUTHEASTERN ALASKA. By H. S. Swarth. *Univ. of California Publications in Zoology, Vol. 24, No. 2, pp. 125-314, Plates 8 (colored), 34 figures in text. Issued June 17, 1922.*

This is another valuable contribution to northern Pacific coast zoology made possible through the interest and practical support of Miss Annie M. Alexander, who has sponsored so many expeditions to this coastal region. It is fully up to the standard of previous work produced under the same auspices.

It is based upon the results of an expedition conducted by H. S. Swarth, working principally on birds, and Joseph Dixon, specializing on mammals, photography, and the nesting activities of birds. The party arrived at Telegraph Creek, British Columbia, at the head of navigation on the Stikine River, May 23, the general neighborhood of which was worked until June 26. The year does not appear anywhere in the text but is given as 1919 in the captions of the accompanying maps and photographs. Various camps were made down stream until they arrived at Sergeif Island Alaska, at the mouth of the river, August 17, remaining until September 7. The material collected, upon which the present report is based, consists of 534 mammals, 638 birds and 24 sets of eggs. Some amphibians were collected but are not reported on here.

Pp. 126-157 are occupied by chapters on Introduction, Itinerary and Description of Localities, Topography of the Region and its Bearing upon Animal Life, and The Zonal and Faunal Postion of the Stikine Valley. These subjects are all developed in a clear and logical manner, presenting much detail of conditions and some important and far reaching generalizations that contain valuable food for thought.

An annotated list of mammals includes notes on 34 species and subspecies, from p. 158 to p. 198. Notable features here are the graphic diagrams showing individual variation within the subspecies of white-footed mice encountered and their relation to local distribution and allied forms. Incidentally it is interesting to note the caution and hesitation with which the author attempts to identify his Grizzly Bears in harmony with the difficult Merriam revision. It argues ill for the results when those less qualified make the same attempt in the future.

The bird list contains annotations on 127 species and subspecies, from p. 194 to p. 308. The volume closes with six pages of literature cited, which seems to be a complete ornithological and mammalogical bibliography of the region treated.

The country discussed consists of two well defined climates and ecological associations. The coastal slope, characterized by heavy rain fall,

comparatively warm and uniform climate, and dense conifer growth, is separated by the Coast Range of mountains from an interior inclining towards the arid, with great seasonal range of temperature, considerable bare mountain side, and a preponderance of deciduous growth. Each of these two areas has its own faunal peculiarities and to discover what happens where the Stikine River breaks through the separating barrier and offers opportunity for the two associations to meet was one of the principal objects of the expedition.

Mr. Swarth regards the coastal strip below Alpine altitude as Hudsonian Life Zone with a strong infusion of Canadian. Too little work has been done in the interior in these latitudes to settle its zonal details but, contrary to previous opinion, he is inclined to regard most of northern British Columbia as in the Canadian rather than in the Hudsonian Zone. He noted a continual increase in elevation up the mountain sides in the life associations as he followed them inland. Important conclusions regarding the relationship between the interior and coast faunas are expressed as follows:

> ". . . not only are comparable ecologic niches on either side of the mountains usually filled by different species rather than subspecies, but that frequently the species are not specially closely related. . . . there is hardly an instance where we were able to trace intergradation along the connecting valley of the Stikine. . . . it was evident that certain subspecies, at this particular point, met as distinct species."

In view of the fact that we usually regard non-intergradation as the criterion of full specific standing the last sentence may appear paradoxical but it may be strictly in accord with good zoological concept. Along an extended line of progressive variation we may arrive at extremes so inherently distinct that when they happen to meet through the vagaries of geographical distribution they may react towards each other as full species though along the chain of connection each link is but subspecifically related to its neighbors. As long as the connections persist unbroken the whole series must be regarded as a specific unit even though the meeting extremes fail to intergrade. Whenever in the vicissitudes of nature any part of the connecting sequence is permanently broken two species must be recognized instead of one.

This distinctness between the coastal and interior forms and the fact that the Stikine River passage is not a general highway of intercommunication for birds (though slightly more so for mammals) suggests entirely different primitive geographic origins for the faunas on opposite sides of the mountains. Mr. Swarth postulates that both came from the south, the interior forms following up the inter-mountain valleys. Strangely enough he does not seem to consider the possibility of arrivals from the east. All across the mid-continental area, running north of the prairies through the woodlands, we have a northwestern extension of pure eastern forms or forms closely related to them. They are constantly reduced in numbers westward but are recognizable well into the interior of Alaska. Nearly on a line with this Stikine River country the valley of the Peace River breaks through the great barrier of the Rocky Mountains, which form the main separation between our eastern and western faunas, and offers passage-way through for many eastern species into the Cassiar region of British Columbia. That some of these eastern races reach the base of the Coast Range is indicated by the following forms listed by Mr. Swarth at Telegraph Creek—Eastern Mourning Dove, Yellow-bellied Sapsucker, Boreal Flicker, Rusty Blackbird, Eastern Chipping Sparrow, Eastern Purple Finch, Eastern Yellow Warbler and Eastern Robin. That most of these birds are rare or of non-occurrence even in migration in southern British Columbia is evidence of an eastern, rather than a southern origin for much of the life of the Cassiar District.

Among some of the questions raised and discussed by Mr. Swarth in his annotated list of birds is that of discontinuous distribution—isolated colonies of forms seemingly identical with those from which they are separated not only by geography but also by intervening distributions of other subspecies. Thus he finds birds on Sergeif Island that he refers to the Eastern Savannah Sparrow, *Passerculus sandwichensis savanna*, whilst the bird of Telegraph Creek is recognized as the western *P. s. alaudinus*. The Eastern Savannah Sparrow is not generally recognized in Canada west of Ontario. That it should jump clear over intermediate territory and intervening races to the mouth of the Stikine River is startling, yet, given that Mr. Swarth's reading of the characters of the specimens in question is correct, strict adherence to Dr. Dwight's dictum, quoted elsewhere in the work, that "we must name a bird by the plumage it is wearing, not by the one that it ought to be wearing because it has been captured within the bounds assigned to another geographical race" leads to just this conclusion. The case is not unique; there are others like it, and there may possibly be more than we are aware. Mr. Swarth says, "I am willing to admit geographical distribution as one of the characters of a form, but to mak

distribution the SOLE character is farther than I care to go. So, on the ground of external resemblance, the Savannah Sparrow of the coast of Southeastern Alaska is here recorded as *P. s. savanna*, but with no belief that it is genetically the same as the eastern subspecies bearing that name. The case is closely paralleled by the Red Crossbills (*Loxia curvirostra sitkensis* and *minor*)." The point to be considered is, if such forms are genetically distinct and we know them to be so, are we justified in falsely naming them what we know they are not? Is the name applied to a collection of superficial characters or has it a genetic association? It is a knotty point to consider.

It is interesting to note that of the two Goshawks collected, an adult is referred to the eastern race, *A. s. atricapillus*, whilst a juvenile is declared to be the western *A. s. striatulus*. This is the rule with the Goshawks of northern British Columbia. Most adults from there are indistinguishable from eastern birds, whilst numerous juveniles are closely comparable to the heavily colored specimens designated by the describer amongst the types of *striatulus*. Peculiar dark adults, absolutely unlike anything ever taken in the east do occur occasionally in British Columbia and adjoining territory, but whether or not they are the mature of the dark juveniles has not yet been determined. Much more information is desired concerning this species.

The Yellow-bellied Sapsucker, *Sphyrapicus varius varius*, was breeding near Telegraph Creek. Two specimens were taken, one typical *varius*, the other "has more the appearance of a hybrid between two species (*varius* and *ruber*) than an intergrade between two such forms, regarded as subspecies." Typical *ruber*, the Red-breasted Sapsucker, which Mr. Swarth regards on other grounds as *conspecific* with *varius* was found a few miles below the above locality without intergrading with it. He did not recognize *nuchalis*, the Red-naped Sapsucker, in the locality at all.

The Flickers were Yellow-shafted and showed no indication of the influence of the Red-shafted, though the region closely approaches its range and promiscuous hybridization between the two species extends over very wide sections of country elsewhere.

Under Cassiar Junco Mr. Swarth uses the name *connectens* Coues, not for Shufeldt's Junco, as does the A.O.U. Check-List, but with a different identification of the specimen to which the describer first attached the name. He characterizes the male of this subspecies, as he understands it, as closely similar to eastern *hyemalis*, the female differing from the male *shufeldti* in "having usually less brown on the back and less pink on the sides." Here is a postulated case where identification cannot be made without having both members of a pair as individually each sex would be referred to different subspecies. The fact of their mating together would seem the only racial criterion.

The Rusty Song Sparrow appears to be one of the few species that seem to have extended their range up from the coast along the river valley.

Considerable space is given to the description of the nesting of the Bohemian Waxwing, which was discovered near Telegraph Creek. Photographs of nest are given, as well as the colored frontispiece by Major Allan Brooks of the young birds just from the nest. The interesting feature of these birds is the presence of fully developed wax tips on the secondaries and the depth of the yellow color on tertials and remiges. There is a map showing the previously discovered nestings of the species but the compiler seems to have missed the records for the eastern foot-hills of the Rocky Mountains near Didsbury and Red Deer, Alberta. These seem perfectly good. The variation in the number of sealing-wax tips in relation to sex is discussed, with the apparent conclusion that it has no such relation. Mr. Swarth thinks the separation of the American and European birds under the name of *pallidiceps* as proposed by Reichenow is valid.

As inferred before, the Yellow Warbler from the interior is referred to eastern *æstiva* rather than to *rubiginosa*, as would be expected.

As for the Alaska Myrtle Warbler, *D. c. hooveri*, Mr. Swarth recognizes a slight difference in size of the specimens ascribed to that race but detects none of the colour differences attributed to it.

All in all, this report is much what a faunal list should be. Though the author sometimes splits into finer units than all of us would agree to name, he does not do so dogmatically, but gives his evidence in a fair and convincing manner. Moreover, he puts his fine divisions to their legitimate use—he splits for a purpose. The essence of scientific research lies in the correlation and explanation of facts rather than in the gathering of those facts themselves. In systematic zoology we have many looking for microscopic facts but too few that seek to interpret or to apply them. Another feature of this and other lists by the same author is that determinations are original identifications and are not based upon preconception or quoted from authority. In fact they present original, not hearsay, evidence and as such can be made the basis of distributional investigations. From the reviewer's standpoint,

it is only under such circumstances that the subspecies should ever be used in a faunal list.—P. A. T.

AN OUTLINE OF THE PHYSIOGRAPHIC HISTORY OF NORTHEASTERN ONTARIO. By W. H. Collins. *The Journal of Geology, vol. XXX, No. 3, April-May, 1922, pp. 199-210.*

Under the above title a very substantial contribution to the physical geography of Canada has been made by Dr. W. H. Collins, Director of the Canadian Geological Survey. The clear and informing mental picture of the series of geographical changes responsible for the physical geography of northeastern Ontario, which it furnishes, makes one wish to see much of it incorporated in the school geographies used in Ontario.

Happily the type of school geography on which the writer's youthful imagination was fed is being supplanted by better ones and it is to be hoped that this supplanting process will continue. The type of geographer who used to write for the public school geographies of the "industrious coral insect" building atoll island harbours for the convenience of the storm-harassed mariner is becoming extinct. Surely the geographer who does not go back of the autobomile age can not long survive in ecologic association with the geographer equipped with geological training. The geography of any region may be regarded as a snapshot of the stage of development or equilibrium which the geologic and biologic agencies operating in it have reached at a particular interval of recent time. In order to understand it in any adequate way the historical or geologic line of approach taken in the paper under consideration is indispensable.

Dr. Collins recognizes six stages in the physiographic history of this region. Cross sections of this and other contrasted regions permit graphic comparison of the structural and physiographic features of the region discussed with other parts of North America.

Teachers of geography in Ontario will find this a particularly helpful paper.—E.M.K.

ORDOVICIAN FOSSILS OF NORTHERN CHINA:—PALAEOZOIC CORALS OF CHINA, Pt. 1, TETRASEPTATA. By Amadeus W. Grabau, S.D. (Palæontologist to the Survey and Professor of Palæontology in the National University, Pekin). *Geological Survey of China, Series B, vols. 1 and 2, Fascicle 1; pp. 127, pls. 1-9, pp. 69, pl. 1.*

The rather recently organized Geological Survey of China has announced titles and authors of a series of monographs on the Palæontology of China. These are to be published as fascicles in four series dealing respectively with the fossil plants, the fossil invertebrates, the fossil vertebrates and ancient man in China.

The first two papers issued bear the titles above. Those who have been accustomed to think of China as a backward nation may feel inclined to revise this opinion after examining this admirable programme and the two examples now before the writer of the way in which it is being executed. In typographical features they are distinctly ahead of most of the palæontological work which has been published in Canada and the United States in recent years.

The "Ordovician Fossils from Northern China" includes a brief introductory summary of the Ordovician stratigraphy of Northern China in which the Upper and Lower Ordovician faunas are listed separately. The systematic portion of the paper includes many new species. The section on the cephalopods includes an elaborate discussion of the phylogenetic significance of the siphuncle of the Holochoanites and the description of a new family. This portion of the paper contains a discussion of the subject of lime deposition by molluscs which will be of interest to many who are not directly concerned with cephalopod phylogeny and morphology.

The excellent drawings which illustrate this paper are the work of a Chinese artist, Mr. K. C Lin.

The ordinal name *Tetraseptata*, under which Professor Grabau places the corals, which form the subject of the second paper, is the equivalent of Heckel's *Tetracorallia* and of Milne-Edwards' *Zoantharia rugosa*. An excellent summary of the morphological characters and development of the *Tetraseptata* precedes the systematic section which includes description of families, genera and species. Four new genera and seven new species of corals are described and illustrated. These and the included families represented in this work make it an important paper to all palæontologists who are concerned with the corals. The corals described range in horizon from Silurian to Permian.—E.M.K.

OLD AND NEW STANDARDS OF PLEISTOCENE DIVISION IN RELATION TO THE PREHISTORY OF MAN IN EUROPE. By Henry F. Osborn and Chester A. Reeds. *Bulletin of the Geological Society of America, vol. 33, pp. 411-490, July 3, 1922.*—The borderland where Archæology and Palæontology meet has been cultivated in Europe by scientists of very diverse kinds of training and widely differing viewpoints. An extensive literature in various languages records the work of the archæologists, geologists and palæontologists who

have dealt with the latest division of geologic time and its human and other records in Europe.

The difficult task of preparing a summary and partial synthesis of the work of thirty-seven of the authors who have contributed to this literature has been carried out by Dr. Osborn and Dr. Reeds in a way which should earn the gratitude of every one interested in either geochronology or the prehistory of man. The maps of central and northern Europe on which Dr. Reeds has shown the several stages of glaciation constitute a valuable feature of this work. The geologist who wishes to know the latest correlation between the several archæological periods and the corresponding stages of glaciation in Great Britain will find it in one of the tables of this paper. Another table shows in parallel columns an amazing quantity of data relating to oscillation of sea level, climatic changes and associated faunas, correlated with reference to the several stages of human palæontology. Other tables show the varve chronology of De Geer and Liden, and the glacial and archæological correlations of Obermaier and of Boule.

An appendix gives critical comments of value by several well-known geologists on the work of the authors dealt with in the paper.

Comments on the relative merits of the diastrophic and eustatic theories in accounting for elevated terraces and other Pleistocene phenomena are an interesting feature of this section of the paper.—E.M.K.

THE AUK, JANUARY 1922. No. 1.

An Adventure with a Pair of Harlequin Ducks in the Yosemite Valley.—By Chas. W. and Enid Michael. pp. 14-23.

An extremely interest ng study of a pair of Harlequin Ducks attracted to close range by baiting. Ample opportunity seems to have been offered for an intimate study of the bearing of the sexes towards each other in which it appears that as in other ducks the male is the suitor and his attentions are received only at the somewhat capricious convenience of the female. In the duck world the female is *the species*, the male being only a gayly colored necessity, dispensed with when his duties are performed. The underwater actions of the species were closely watched in the clear brawling mountain stream. When they dive they descend to the bottom where, facing always upstream, with head low and body raised and wings slightly expanded they allow the pressure of the current to hold them against the gravelly bottom whilst they progress against the stream by walking. Some remarkable photographs were taken of these beautiful birds at the feeding stations.

Field Identification—By Ludlow Griscom, pp. 31-41.

A discussion of eye-sight records from the standpoint of the trained observer. It would be well if it cou'd be widely distributed. The author gives two lists of birds, those that he regards as practically unidentifiable by eyesight observation and those that are nearly so. It is notable that we constantly come across birds in both lists in field observations made by those much less qualified by experience than Dr. Griscom. He gives the qualifications expected by an editor of a reporter of an important eyesight record. His standards, though high, are reasonable. He cautions that probability is not sufficient for acceptance—that certainty is the only criterion. He states that an authority's word on an occurrence is accepted not through reliance on that authority's veracity but through confidence in his knowledge and experience. It is to be noted that the greater an observer's reputation is in these directions the less he relies on the weight of his mere word. An addition that might be made from an editorial standpoint is, that however much confidence our personal friends and intimates may have in our knowledge and experience we cannot expect strangers to share it without evidence. Little-known writers are sometimes deeply hurt at non-acceptance of their statements before they have done anything to build up confidence outside of an immediate circle of acquaintance. It should be borne in mind that published notes are to convince not only one's friends, but strangers and even posterity who know not Joseph.

A Calendar of Bird Migration.—By Norman Criddle. pp. 41-49.

This is a remarkable record of migration dates of some 131 or more species noted at Aweme, Manitoba. Many of the records are for 25 years' running and show an unusually faithfully kept record. It is in tabular form, showing the number of years of observation, the species and the average and extreme dates of arrival, fall and spring.

The list of species is interesting and contains some surprises. Both Prairie and Saskatchewan Horned Larks are given as spring arrivals and the former is recorded as an occasional winter resident. Hoyt's or the eastern form are not recorded though the former is the natural expectation in the wintering bird and we have evidence of both subspecies from the Province. That there should be five years' records for Shufeldt's Junco in Manitoba is remarkable. Though we are aware

Mr. Criddle has good authority for his identification it would be interesting to know when the diagnosis was made and what forms were then currently recognized. The subspecies inhabits the inter-mountain region of British Columbia but scarcely crosses the divide into Alberta where its place is taken by an entirely different form. The nearest subspecies of Junco to typical *hyemalis*, the regular Manitoban form, is *mearnsi*, the Pink-sided Junco, and its nearest regular station probably the Cypress Hills. Even though Shufeldt's Junco has been taken in Illinois, that it should repeatedly occur in Manitoba and not normally in intervening country to the west is remarkable indeed. It might well if these specimens were re-examined to see just which of the currently accepted subspecies they can be referred to.

Notes on Tubinares, Including Records Which Affect the A.O.U. Check List.—By Robt. Cushman Murphy. pp. 58-65.

This most interesting part of this, from our standpoint, is the record of *Thalassarche chlororhynchos*, The Yellow-nosed Mollymauk, from near Seal Island, off Machias Bay, Maine, August 1, 1913. This Seal Island is almost on the New Brunswick-Maine border and this is all but technically a Canadian record for this Albatross. It is also a new species for the North American list.

The writer doubts the advisability of including Hornby's petrel in the North American list as Admiral Hornby could easily have obtained the type specimen in the South Pacific on his way to or from his station on Vancouver Island.

Thirty-Ninth Staied meeting of the American Ornithologists' Union—By T. S. Palmer.

The meeting was held in Philadelphia, Nov. 7-10, 1921. Amongst those present were several representing Canada. Major Allan Brooks of Okanagan Landing, B.C., was elected Fellow. Amongst the papers read was one *On Some of the Breeding Birds of the Saskatchewan*, by Geo. H. Stewart, 3rd. It does not seem to appear to that author that "The Saskatchewan" is a rather long river. The locality really investigated was the Crane Lake vicinity in the Province of Saskatchewan. Evidently the article was introduced in the title from a sense of the picturesque rather than from a knowledge of geography. To describe a locality about St. Louis as "The Missouri" would be a parallel case. That such a slip should escape the eagle eye of the editor of *The Auk* is even more remarkable.

The Kittiwake in Florida.—By Allan Brooks. General Notes, pp.99-100. Major Brooks records the taking of a Kittiwake at Jupiter, Fla., January 24, 1921.

Cory's Shearwater Off Newfoundland. with Remarks on Its Identification in Life.—By Ludlow Griscom and E. R. P. Janvrin, pp. 103-104.

This rare Shearwater was observed near Bonne Bay, western Newfoundland, August 11, 1920. The writers remark upon the unexpectedly distinct specific characters it presented in life. They give details of field marks. On the whole, it "appears as a gray-headed bird with a white throat and without any contrast of color." However, it does not seem safe to accept eyesight records for this bird from observers less acquainted with the allied species and of less experience than Dr. Griscom.

The Mourning Dove in Newfoundland.—By Harrison F. Lewis, pp.106-107. Recording a specimen of Mourning Dove taken near Trepassey, Newfoundland, October 10, 1920. Identification made from a photograph of the mounted bird. This is the first record for Newfoundland.

The Short-Billed Marsh Wren in the Montreal District.—By L. McI. Terrill, pp. 113-115.

An account of colonies found in the vicinity of Montreal at various times since June, 1911. Full and convincing details are given. The reviewer can add that specimens are deposited in the Victoria Memorial Museum.

Additons to the Summer Avifauna of Lake County, Minn.—By Alvin R. Cahn, p. 120-122.

This is a short list annotating 21 species in addition to those previously reported by Prof. C. E. Johnson from this county. As the area treated is close against adjoining parts of Canada from which we have little or no information it is worthy of special notice.

In *Recent Literature* there is noted a paper by Etta S. Wilson in the Pro. Indiana Acad. Sci. for 1920, wherein is recorded that large numbers of Swans were observed passing over Detroit and a Trumpeter Swan was identified in 1904 by its call. This is pretty poor evidence for a record that may be possible enough but is certainly very unlikely, especially as so few observers are qualified by experience to distinguish between the notes of the two birds. It is well known that the Whistling Swan is numerous enough on Lake St. Clair, on migration, and the reviewer has seen there, in spring, massed flocks that looked, in the distance, like fields of ice.

B. A. Bensley, University of Toronto Studies No. 19, pp. 3-7, 1921, reports the reception by the museum of an egg of *Struthiolithus chersonensis*

from Honan, China. But six eggs are known. the others being from southern Russia and Manchuria.

Under "Correspondence" appears a communication from Hoyes Lloyd urging that when common or vernacular names are being considered some attention should be paid to their legal status. All game and bird protection legislation has of necessity to name species definitely and he wishes, in view of some proposals that have been made, that one name for each species be made official. The editor in reply, having in mind the strange nomenclatural decisions of some courts, hardly realizes all the sides of the argument. The fact is that the courts that have to pass on such questions are not those of the United States only. It may well be that official findings of the A.O.U. might not be recognized in the technicalities of the American system, but they would certainly have weight with our courts, whose somewhat different methods permit the spirit of the law to be considered in the interpretation of the letter.

There has been for some time in the pages of *The Ibis* a discussion on the question of subspecies. It has extended to *The Auk* and on pp. 145-147 is a letter on the subject by Percy R. Lowe of the British Museum (Natural History) correcting a misquotation attributed to him. He divides subspecies into two classes, one showing environmental, somatic, acquired and non-heritable characters, the other mutational, germinal and heritable ones. He cites cases as apparent illustrations of each. As we read, it seems that he would call a group of men tanned by exposure to sun a subspecies of the first class whilst Spaniards of dark complexion might be the other. It is remarkable that a biologist of Dr. Lowe's standing should regard acquired differentiation as subspecific at all. It may be difficult to prove that certain characters are somatic but when they are proved so it would seem to disqualify them from any taxonomic consideration. If this confusion in fundamental conception of taxonomy exists the sooner it is cleared up the better. If we cannot get togeher on broad principles, agreement on detail is hopeless. Strangely the editor does not question the principle raised but doubts the assumption in the examples.—P. A. T.

THE AUK, April, 1922, No. 2.

A Comparison of the Food Habits of British and American Starlings, by E. R. Kalmbach, pp. 189-195.

Mr. Kalmbach was joint investigator and co-author with I. N. Gabrielson in U.S. Biological Survey Bulletin No. 868 on the Economic Value of the Starling in the United States, 1922. He is therefore most competent to discuss the American side of this subject. It appears from a report of Dr. Walter Collinge who has conducted similar investigations in the British Isles that in the past ten or twelve years there has been a marked increase of the Starling in England and Scotland. With numbers has come a change in food habits and economic influence until a bird that was regarded as distinctly beneficial has now assumed quite a different aspect. Summarizing the present status of the species in the two countries, Mr. Kalmbach presents the following comparative percentages of the bird's activities:

	In Great Britain	In America
Beneficial activities.....	34.50	47.31
Neutral activities.....	24.50	42.65
Injurious activities.....	41.00	10.04

The only apparent reason for this undesirable change in England seems its great numerical increase. Dr. Collinge reports flocks of from 150,000 to 200,000 migrating in fall into the British Isles from the northeast. The supposition is that the normal insect food is insufficient for all and they turn their attention to other supplies of economic importance. In spite of the favorable standing that Mr. Kalmbach allows the species in this country, such facts do not quite allay our fears as we watch its steady increase in the States and its gradual extension across our borders.

The Function of the Oesophagus in the Bittern's Booming, by James P. Chapin, pp. 196-202, 2 plates.

We have several times noticed and noted a gelatinous thickening of the neck skin of some male Bitterns in springtime and, reasoning by analogy with similar conditions found in other species, notably the Prairie Hen, have surmised that it might be connected with the peculiar booming note for which the species is famous. Dr. Chapin has investigated the structure and finds that the neck can be inflated by blowing into the gullet. It is known that the booming is preceded by writhing contortions during which the neck swells, only to subside with the last sounds of the peculiar love song. This suggests that the neck sacs have a direct connection with the booming and it seems not too wild a guess that the contortions are the act of filling them with the air whose escape has something to do with the sound.

Dr. Chapin incidentally investigates the display plumes over each shoulder the erection which has puzzled ornithologists ever since Wm.

Brewster first called attention to them. He finds muscles attached to or near the bases of the feathers that seem quite adequate for the work.

Roderick Ross MacFarlane, 1833-1920, by Edward A. Preble: With photograph.

No one can go far in Canadian ornithology or the history of the Northwest Territories of the Dominion without having to consider the work of Roderick MacFarlane, Scotsman, Hudson's Bay Co. Factor, Naturalist, Explorer and Corresponding Fellow of the American Ornithologists' Union. Established in the farthest flung outposts of civilization, with considerable time on his hands, little intellectual communication with the world, and a natural taste for Natural History, he was introduced to the fascinations of that science by the inspiring enthusiasm of Robert Kennicott on one of the latter's expeditions on behalf of the Smithsonian Institution . He seized upon the subject as an outlet for his energy and interests and if to-day we know more of the great hinterland adjacent to the Mackenzie Valley than we do of many long settled regions it is largely due to the efforts of Roderick MacFarlane. Fort Rae, Fort Resolution, old Fort Good Hope, Fort Liard, Fort Anderson, Fort St. James and Cumberland House were all the scenes of his labours, but most especially is he to be remembered for the work done on the Anderson and Lockhart Rivers and Franklin and Liverpool Bays.

From 1859, when he first met Robt. Kennicott, to 1893 with slight intervals he collected assiduously. The bulk of his material went to the Smithsonian Institution at Washington; some of it to friends in Scotland. One shipment destined for the Geological Survey Museum (now the Victoria Memorial Museum, Ottawa) was lost somewhere in the rapids on its long and dangerous route and has ever since been mourned, not for its intrinsic value alone, but that the Canadian National Collections were deprived of mementos of one of Canada's historic characters.

MacFarlane's publications were not numerous, but were important. An account of his first Anderson River trip appeared in the *"Canadian Record of Science"* in 1890. A year later he published *"Land and Sea Birds Nesting Within the Arctic Circle,"* which was reprinted the year following, with additions and corrections, in the Proceedings of the U.S. National Museum. In the same medium in 1905 appeared a similar list of mammals. His last important work on birds was an appendix to Chas. Mair's *"Through the Mackenzie Basin"* in 1908, entitled *"List of Birds and Eggs Observed and Collected in the Northwest Territories between 1880 and 1894."* This includes his Fort James (in what is now northern British Columbia) and Cumberland House (now included in Manitoba) observations.

In 1894 he retired from the service of the Hudson's Bay Company and spent the rest of his days in Winnipeg. He remained active of body and keen of mind in his old age and passed away April 14, 1920.

Adventures in Bird-banding in 1921, by S. Prentiss Baldwin, pp. 210-224.

The author continues his report on his most interesting work, which has been mentioned at greater length in these pages before.

Some Bird Notes from Indian Bay, Man., by William Rowan, pp. 224-232.

This consists of annotations of 106 species observed in the summer near the Biological Station of the University of Manitoba on Shoal Lake, Lake of the Woods District, Manitoba. (This is not the Shoal Lake north of Winnipeg reported on by Taverner in *"The Ottawa Naturalist"* in 1919.) Biologically this is a most important and interesting region where little work has been done but where eastern and western influences can be expected to meet. There is nothing startling in the list unless it be the breeding of the Evening Grosbeak, which has been reported before and mentioned in these pages previously, but it gives another spot on our distributional maps for which we have definite and authoritative records. Most of the records are based on specimens and the others are accompanied by such corroborative evidences of care as to make them quite convincing. One of the rather surprising things in the list is the occurrence of the Black-billed Cuckoo nesting alongside of summering Canada Jays, Three-toed Woodpeckers and Hawk Owls. However some even stranger faunal mixtures than this can be found in the central and western portions of the Dominion.

Seventh Annual List of Proposed Changes in the A.O.U. Check-List of North American Birds, by Harry C. Oberholser, pp. 243-249.

This involves some 43 proposed changes in nomenclature. The majority of them have originated in the works of Dr. Ernst Hartert and of Mathews and Iredale. The activities of the former have been towards lumping Old and New World species. The latter have been minutely dividing genera, a process that has called forth considerable protest from American ornithologists. It is hardly worth while to mention all of these items until they have been acted on by the Committee of Nomenclature. One subspecies of parti-

cular Canadian interest is proposed, viz., *Dendroica audoboni memorabilis* Oberholser, *Ohio Jour. Science*, XXI, 1921, p. 243, Range; breeds from Saskatchewan and Alberta to Arizona and Texas. The reviewer has not yet seen a description of the distinctive characters, but it is evident that we will have to examine the Audubon Warblers from the Prairie Provinces.

An Enormous Flock of Canvas-backs Visit the Detroit River. General note by Etta S. Wilson.

Reporting approximately 10,000 birds in the Detroit River from January 24 to the last of February, 1922.

The European Gray Partridge in Saskatchewan, by John Smith Dexter, pp. 253-254.

Recording the taking of this species (so-called Hungarian Partridge) at Rutland, Sask., November, 1921, and giving an outline of its spread since introduction into Alberta in 1910 and 1911 Essentially similar to like note by Mr. F. Bradshaw published previously in these pages.

Economic Status of Coragyps urubu in British Guiana, by Casey A. Wood, pp. 255-256.

The sanitary value of vultures as scavengers in tropical American towns is well known. In this case, however, Georgetown had an organized health department and sanitary staff and was independent of such a crude system of waste disposal. This removed the single decided benefit the birds might have conferred upon the town, leaving only an accompanying danger. The inhabitants rely on rain caught on the house roofs for their water supply. The vultures, which perched commonly on the houses, were shown to contaminate seriously this source of supply. Native cooks could not be trusted to boil water for their employer's use and altogether neglected to do so for their own, so for the general good the birds were destroyed or driven away to other communities where the inhabitants were not so particular or where civilized sanitary methods had not destroyed their legitimate occupation.

Hawk Migration at Whitefish Point, Upper Peninsula of Michigan, by M. J. McGee, pp. 257-258.

Describing a hawk migration route, a jumping-off place for Canada about 40 miles northwest of Sault Ste. Marie and 20 miles from the Canadian shore. Every year thousands of hawks take this route; contrary to our experience at Point Pelee on Lake Erie, more in spring than fall. This year, under the incentive of a bounty given by the State of Michigan, 2007 hawks were shot at this point, one man killing as many as 60 in a single day. A shooter reported having shot a Turkey Buzzard and seen another here (and gave descriptive evidence). This is a long way from the nearest previous record.

Note on the Philadelphia Vireo, by Harrison F. Lewis, pp. 265-266.

In reply to criticism that Mr. Lewis overlooked H. Mousley's record at Hatley, Que., in his study of the nesting of the species, he explains that it had not yet appeared in print when the said paper was prepared.

Under *Recent Literature* the Editor notes:

Observations on the Breeding Habits of the Merlin, by Wm. Rowan, British Birds, XV, 1922.

Though dealing with an extralimital species this paper contains so much of particular interest that we hope to take it up more fully later.

Under *Notes and News:*

The announcement is made of a cash contribution to the National Association of Audubon Societies (for the protection of birds) of $200,000. This is the culminating donation from an anonymous friend who had made many smaller ones. It will be added to the permanent endowment fund, which now totals $657,000.

The list of the A.O.U. membership finishes the volume. In it we note Canadians as follows: four Fellows, one Member and 53 Associates distributed amongst the various provinces as follows:

Ontario	28	Nova Scotia	4
Quebec	11	Manitoba	2
British Columbia	6	Alberta	2
Saskatchewan	4	New Brunswick	1

Amongst the Corresponding Fellows we note the name of Montague Chamberlain, now of Boston, Mass., but originally of New Brunswick. His "*Catalogue of Canadian Birds*," 1887, was one of the first attempts to review the bird life of the whole Dominion. Unfortunately the data were fragmentary at that time. The Chamberlain edition of Nuttall, 1891, is still the popular edition of that author and is on the shelves of nearly every working ornithologist. Much that we know of the bird life of the Maritime Provinces is due to his zeal. He is one of the four living founders of the A.O.U., he and Thomas McIlwraith of Hamilton, Ontario, being the Canadian representatives when the Union was formed. W. E. Saunders of London, Ont., has almost equal length of service, as in 1883 he joined the A.O.U. immediately after its formation. For many years Mr. Chamberlain was an active contributor to "*The Auk*," but he has been quiescent for so long now that few Canadians realize that he is still with us.

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The Canadian Field-Naturalist

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*THE COYOTE IN MANITOBA**

By N., E., and S. CRIDDLE

THE coyote or prairie wolf (*Canus latrans* Say) inhabits all the prairie country of Manitoba and its range extends well into the fringes of the heavy timber of northern and eastern sections. It was originally more or less restricted in distribution by the forest areas but so great has been the destruction of these that the animal has now greatly extended its range.

While the coyote is a prairie animal it prefers, in reality, those districts which are undulating in nature and which provide a semi-wooded condition. River flats and the adjacent banks have a special attraction for it, doubtless because such situations provide a maximum amount of shelter combined with food and excellent breeding places. From these general haunts the wolf wanders far afield in search of food, so that there is very little indeed of the whole country that is not more or less overrun by it, at one time or another.

Coyotes are timid, suspicious animals that usually avoid the close associations of man during the day time, unless they can find convenient concealment by aid of shrub or tree. At night, however, they become more bold and prowl even to the doorsteps of human habitations in search of food. So far as human beings are concerned there are few animals to be feared less than the coyote and the old stories of their having attacked children have never been substantiated by evidence of a trustworthy nature. Thus, while these wolves are ever ready to profit by the new means of procuring food which man has provided they show no desire to meet him face to face.

There is reason to suspect that the female coyote retains possession of the area in which her dens are situated for a number of years, perhaps throughout her life, but that the males, though remaining faithful to their mates for the season, are obliged to alter their habitats due to the law of battles which assigns the prize to the victor. In other words, the original pair will only remain together as long as the male retains his supremacy over his rivals.

Both parents take an active share in attending to their families and there is no doubt that the male provides food for the female when the whelps are first born. The young are reared in dens which frequently are formed from an enlarged badger hole. Very little effort is made to provide a bed and often the only indications of one consist of a few dead leaves. The bed, however, is always dry.

For some time before the young are born, and often for a considerable period afterwards, both the male and female coyote spend much time in digging out various old holes or enlarging those of other animals. Dens are occupied for many years and probably throughout the entire life of the female. Generally, however, the same pair possess two or more prominent holes, perhaps several miles apart, which are occupied alternately or for several years in succession, depending upon circumstances relating to the previous year. Besides these main residences many other holes are enlarged from year to year and often from week to week. Thus the presence of breeding coyotes in any locality is often indicated by this habit alone. Frequently these minor residences are temporarily occupied by the young after leaving the original burrow. At other times they appear to be of no immediate value though they may later become main dens. These supplementary holes also act as emergency retreats at a time of danger after the young have begun to wander, or as places to which they may be taken by the adults earlier in their lives.

The burrows of coyotes are to be found in a great variety of situations. Hillsides covered with brush are most frequently selected but nearly every imaginable place may harbor them, from situations in dense woods to bare hillsides or open prairie. The dens vary much in depth and length; their depth being largely influenced by the situation. Thus, in flat country the holes slant downwards but a few feet before turning in a horizontal direction; whereas on hillsides they

*The observations upon which this article is based were made over most of the coyote range in Manitoba and they extended over a period of fully thirty years. More extensive studies were made, however, in the vicinity of the writers' home near Treesbank, a territory particularly adapted to the coyote's requirements.

may penetrate directly into the hill itself. In length the newer burrows may not exceed five feet while the old ones have been known to extend for more than twenty feet. Usually but one entrance occurs, though at times there may be two or even more.

The young are born in late April and the litters vary in numbers from one to fourteen; six being the average of more than twenty litters observed by us. It is probable that the smaller families have been reduced by death soon after, or at birth; while it has been suspected that the larger ones really constituted the offspring of more than one mother. Indeed we have evidence of this, in one instance, when a den was found containing seven young, three of which were fully two weeks younger than the other four. How these young got together or why was unknown to us.

There is no doubt that the food supply has an important influence on the size of the resulting rearing. This has been interestingly demonstrated during the last few years through the fluctuation in the number of brush rabbits (*Lepus americanus*). When these rodents were at their greatest abundance the coyotes' litters were large and nearly all the young were reared to maturity. During 1918, however, the rabbits' population dwindled to quite insignificant proportions and in almost every case the coyotes' families were small and but few attained the adult state. We may add that these observations, made by us, have been supplemented by neighbors and by the Indians who make a practice of seeking young wolves for the sake of the bounty provided for their destruction.

The young coyotes usually remain close to the vicinity of their original home until late June, when they commence to wander from one hole to another, and it is at this time that the value of the supplementary burrows is demonstrated. The young may scatter over a large area at this period of the year and when danger threatens the numerous holes become exceedingly valuable as hiding places. The whelps remain with their parents for nearly two months longer, after which they largely depend upon their own exertions for food.

The parents attend to the young with great care throughout their immature stages and use considerable cunning in attracting the human enemy away from their dens. A characteristic bark and howl uttered when man is near is often the means of locating a den, little as the animals intend this. It is, furthermore, an indication that there is a family in the district though, as a matter of fact, the den may be a mile or more away and so effectively concealed as to baffle all efforts to locate it. While these wolves are very solicitous for the safety of their families they make no effort whatever to defend them from peril or even to remove them from their dens when for instance, a coat is thrown over the entrance of a burrow containing young and is all that prevents the parents gaining access to it over night. While, however, they keep at a safe distance from man in this respect, they show much cleverness in luring dogs from the dens, and, at times, attack them with great boldness.

As was remarked above, the young appear to depend largely upon their own exertions for food in late August though they are still frequently met with in the company of their parents. It is doubtful whether the latter support them to any appreciable extent at this time, especially in years of food scarcity. This is indicated by the numerous examples of half-starved animals which we have observed at this period of the year and we are confident that many die of starvation before they attain proficiency in hunting equal to that of their parents.

Coyotes often hunt in company and while doing so appear to show considerable method in the manner in which they go about the chase. At other times they single out their own particular quarry, which, when it is a rabbit, they have been observed to chase directly through the thick willow brush, following more by scent than by sight. Their acuteness of scent undoubtedly enables them frequently to surprise their prey and the surprise method of hunting is unquestionably one of their favorite means of obtaining food.

The weird howls to which prairie wolves give utterance, more frequently during the twilight hours, show much variation and without doubt convey numerous meanings, several of which are not hard to interpret. To one not accustomed to them the united cries of half a dozen will be mistaken readily for those of a pack of twenty and perhaps occasion no small alarm, however little this is warranted. To us there is something especially interesting in the coyote's cries and without them there would be a blank much regretted. Usually a coyote serenade begins by a single wolf uttering a loud shrill howl which is answered by another animal, perhaps some miles away. Then, in a moment, the whole air resounds with a chorus that is truly wonderful, however much it may make the novice tremble or run for safety. This vocal demonstration may terminate as suddenly as it began but at times it goes on intermittently for an hour or more and includes the voices of animals many miles apart. The vocal utterances include a bark not unlike that of

a dog, location cries, hunting cries, danger signals and perhaps challenges as well. We doubt whether there is an animal on the continent with a larger number of signals or one that can make them known to its fellows at a greater distance or to better advantage.

Coyotes frequently wander far in search of food and often their favorite hunting grounds are a dozen miles or more away from their dens. In winter they have no fixed abode but may be met with resting on some sunny bank, upon a straw pile or upon some other prominence, from which point of vantage they can view the surrounding country. The condition of the snow largely influences their presence in a given locality. A soft or semi-frozen surface makes hunting almost impossible and therefore obliges the coyote to seek more suitable surroundings. Often the only practical means of subsistence, at such times, is a dead horse or cow that has been dragged away from the barn by a farmer. Like many carnivorous animals the coyote kills more than is required for immediate use, when the opportunity offers; the surplus, when not too large, is buried as a dog buries a bone.

THE FOOD HABITS OF COYOTES.

The coyote is primarily a rabbit feeder and before the arrival of the settler, two-thirds, at least, of its food probably consisted of these rodents. In later years, however, the introduction of both poultry and sheep has made other food available. Under the new conditions brought about by the introduction of domestic animals, the food habits of the coyote become of economic importance and we have, therefore, thought it wise to relate briefly what we have found these habits to be.

The greatest losses inflicted by coyotes are occasioned to the live stock industry; the animals affected being mainly sheep and poultry. The general encouragement that sheep farming is receiving in Western Canada makes the first of these injurious habits of special importance. There is no doubt that the losses to the farmer through prairie wolves, though exaggerated, have been the means, justly or not, of discouraging many prospective sheep farmers. Certainly some farmers have made and are making a success of sheep raising in spite of coyotes but whether their success might be repeated on a much larger scale is a question as yet undecided. There is no doubt, however, that the industry would be considerably enhanced were the coyote menace removed. The raiding of poultry runs is an old habit of the coyote that has long since set a price upon its head, and the saving to poultry raisers would also be considerable, especially where turkeys are concerned.

Apart from the losses to sheep and poultry coyotes occasionally kill a young calf or pig, though this is not a constant habit of the average prairie wolf. As a matter of fact such killings, or even those of sheep, may often be traced to a single old coyote which has discovered that domestic animals are more easily secured than wild ones. This is a habit peculiar to many old carnivorous animals. At times, however, we find young wolves the cause of the damage before they have acquired proficiency in hunting wild animals.

Next to the depredations upon farm animals come those upon game or other useful creatures. Grouse are quite frequently killed while young, as are ducks and smaller birds. Nesting birds or their eggs also are taken when opportunity offers. Deer are reported to have been destroyed on various occasions, especially during severe winters when the snow is deep and firm enough to support the coyotes but not the deer. Other useful animals such as weasels and skunks may also suffer from coyotes.

In summing up the evidence against coyotes we would point out that the loss to domestic animals caused by these wolves is greatly influenced by, and is in correlation with, the available native food supply, the most important item being the bush rabbits. When these rodents are plentiful the wolves pay little attention to the farmer's flocks. On the other hand a scarcity of rabbits is sure to be accompanied by numerous raids by coyotes upon the poultry runs and on sheep. We would draw especial attention to the contrast in losses caused in the years of 1918 and 1922 as examples of this; the former year being one of rabbit scarcity, the latter one of abundance.

Turning to the usefulness of coyotes we would first draw attention to the fact that bush rabbits at times have become a serious pest. Millions of young trees, both under cultivation and in the forest have been destroyed by them. Since the normal food of coyotes consists of these animals their value in maintaining a natural balance is unquestionable. Other rodents also fall ready victims to the coyote's persistent hunting, particularly gophers, mice and voles. The destruction of these smaller rodents is especially marked iny ears of rabbit scarcity when coyotes have either to make up the deficiency of rabbits by consuming smaller animals or to die of starvation.

Of the minor uses of coyotes may be included that of eating insects. This may not be an extensive habit but it is interesting to note that the animals on several occasions have been known to

follow the plough, at a safe distance, and pick up white grubs (*Phyllophaga* spp.) and large beetles. They also have been observed snapping at and eating grasshoppers, though this may be more in play than of necessity.

Coyotes are also vegetable feeders in times of flesh scarcity. Choke Cherries (*Prunus virginica*) form a much sought-after ingredient of diet, as the tracks around the bushes show. Indeed, on one occasion, we actually surprised a coyote standing upon its hind legs, eating the cherries too high up to be reached otherwise. We have also found wheat and oats in their dung.

Such, in brief, is a summary of the coyote's food habits. In arriving at our conculsions we have endeavored to obtain data from as many sources as possible, not forgetting the examination of dung, which has provided marked testimony in favor of the wolf by showing a great predominance of the remains of gophers and mice during years of rabbit scarcity and of rabbits when they were plentiful.

An account of the coyote's economic standing, however, would be far from complete were we to omit the greatest of all its uses, namely, its value as a fur-bearing animal. The demand for the pelts has increased enormously within the last twenty years and as our northern animals are among the best fur producers it will be understood why they are widely sought after. Naturally the revenue from this source is considerable and the extermination of coyotes from the trapper's and fur-lover's standpoint would be little short of disastrous.

At this point it would be well to mention perhaps the most important consideration of all in the economic status of the coyote, that is to say, its ability to spread certain parasites. The fatal affection of sheep known as gid, is due to bladder-like cysts on the brain. This in reality is caused by an immature stage of a tapeworm found in coyotes, dogs, etc., and so far as is known, has no other means of spreading than through these animals. The chief method of distribution seems to be the devouring by carnivorous animals of carcasses of sheep which have died of the disease. Dr. Seymour Hadwen, formerly Chief Veterinary Pathologist of the Dominion, who furnished this information, informs us that gid in sheep is not uncommon in Montana and that it has been found in Saskatchewan. Should this disease ever become prevalent in Canada the problem of coyote control would doubtless assume a much more serious aspect. Prompt destruction of carcasses affected by gid should, however, do much to mitigate the menace.

Another tapeworm in which coyotes act as one of the hosts is that where the bladder stage of the parasite occurs in rabbits; both the bush and jack rabbits being affected. This parasite becomes extremely common in years of rabbit abundance and it undoubtedly serves as a marked influence in reducing them in numbers.

An interesting feature in the life of tapeworms is that the bladder or cyst stage so weakens the rabbits as to make them fall a ready prey to coyotes. In this way the parasites are perpetuated much more readily than would otherwise be possible. Briefly the full life history of the parasite is as follows. The adult tapeworm occurs in coyotes, dogs, etc. Its eggs or segments pass through the mammal and are taken up by the rabbit when feeding; they then develop into the bladder cysts in the rodents, and, being devoured by wolves, etc., transform into tapeworms.

In the case of this rabbit-coyote parasite, the destruction of either animal would practically eliminate it but it is a question whether providing the rabbits with a cleaner bill of health would be an advantage, for we presume the rabbit would be the survivor.

It will be noted from the above discussion that the coyote has its harmful as well as its useful habits and if we could but prevent the injury it does and preserve its uses we should solve a problem well worth while. Fortunately, there is little real danger of exterminating the animal at the present time and we need, therefore, have no hesitation in attempting to reduce its numbers in districts where serious losses are taking place.

THE CONTROL OF COYOTES.

Up to the present time the chief means adopted for controlling coyotes in Canada has been the offering of bounties for their destruction and enormous sums of money have been expended as a result of this policy. The question arises, have these bounties accomplished the object they were provided for? We can discover no evidence to support such a belief. Apart from the obvious drawbacks of all bounties, such as cost, etc., it is very doubtful whether the majority even partially accomplish the objects for which they were intended.

We have already shown that the survival of young coyotes is largely a question of food supply. Now if we reduce their numbers at the very time when the struggle for food is most acute we may, by removing the surplus, actually do what nature would have done by slower means and thus insure the remaining whelps becoming strong, vigorous animals. With reference to adult wolves, it should be borne in mind that the number killed are secured almost at random by farmers and not

in any way through systematic hunting for the sake of the bounty. We write, of course, of summer conditions. In winter, trapping or hunting by other means provide their own remuneration in the high price paid for pelts. The bounty, therefore, in this connection is no inducement for killing. Should it be necessary or desirable to reduce the number of coyotes we believe the only practical means of accomplishing this is to be found in the employment of a few expert hunters during the winter months. Such hunters would be empowered to use poison when it could be employed without danger to dogs, etc., and they would be under the necessity of making direct returns to the department employing them.

As regards protection against coyotes in stockyards and on farms it is well known that coyotes object to jumping over obstacles of any height. They are also timid, suspicious animals and consequently are checked by any reasonably good fence. They will learn, however, to make their way through the ordinary fences, so that it becomes necessary to erect something more substantial, when it is desirable permanently to prevent coyotes from entering certain areas. For this purpose the first principle is to prevent the animals from forcing their way through or crawling under fences. The fence, therefore, especially for sheep, must be close to the ground, should be a mesh averaging about five inches and be about three feet in height with one or two strands of barbed wire above, some six inches apart. For poultry, ordinary poultry netting, sufficient to retain the birds, with a single strand of barbed wire above should answer all purposes. While the initial cost of erecting suitable fencing may be high the benefits to be derived would appear to make it a practical part of the equipment of poultry raisers in districts where coyotes are troublesome.

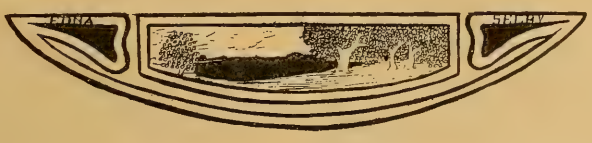
Various devices, apart from fences, have been used to protect sheep. Among these are bells attached to the sheep, which have met with some success. Probably any article tied around the sheep's neck would attain the same end, provided it was first handled before turning the sheep out each morning.

Lastly, since the thief, as has been mentioned, is often a single old wolf, a careful watch on days when the wind blows away from the locality in which the coyote is hiding will often enable the farmer to destroy the depredator.

SUMMARY

The coyote is an animal of beauty, activity and resourcefulness, in which regard it has few equals in North America. In its original wild state, before man interfered with its habits, this prairie wolf competed in its cunning with that of its fellow inhabitants of the country and in the struggle thus provided it fluctuated from year to year in accordance with the prevalence of its food supply, of which bush rabbits constituted by far the largest part. Then came our civilization and with it the introduction of poultry and sheep, thus offering a new food supply to the coyote. As these domestic animals were often more easily secured than the wild ones, the coyote found the temptation too great to be resisted and so, in our eyes, became a thief. This is how conditions stand to-day. The damage done to the sheep and poultry industries is extensive in years of rabbit scarcity but falls to insignificance at other periods. Coyotes also spread certain parasites, some of which are injurious to domestic animals, though others are useful in checking pests. The coyote has also some useful traits, among which is the destruction of rabbits, gophers and mice, which habitually take toll of crops or destroy young trees. This wolf has also a pelt which secures a high price in the market.

Wire fences with strands five inches apart each way and three feet in height are considered wolf-proof. Poultry are easily protected by means of wire netting. Unfortunately the high cost of wolf-proof fencing prohibits its general use at present, and therefore it is occasionally desirable to reduce the number of coyotes. For this purpose the payment of bounties is not warranted and it is suggested instead that a certain number of expert hunters be employed. It would probably be necessary to engage such men only during years of rabbit scarcity, the hunting would be done in the winter time and the government would have full supervision over the men employed. By these means we believe the coyotes could be reduced sufficiently in numbers to enable sheep farmers to rear their flocks in comparative safety until such time as wolf-proof fences could be erected. In this way a farmer would be enabled to preserve his flocks as well as a valuable fur-bearing animal.



A NEW SPECIES OF CORYTHOSAURUS WITH NOTES ON OTHER BELLY RIVER DINOSAURIA

By CHARLES W. GILMORE

Associate Curator of Paleontology

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THE University of Alberta has in its collection of vertebrate fossils from the Red Deer River localities in Alberta several specimens which are here described as contributing to a better understanding of the skeletal anatomy of the genera to which they pertain. In addition to the new species herein described, other specimens furnished information of such interest that it should be made available to students of the dinosaurian Reptilia.

I take pleasure in acknowledging my indebtedness to Dr. J. A. Allan for the privilege of studying these specimens, and also for making it possible for me to undertake this work.

A NEW SPECIES OF CRESTED DINOSAUR.

A partially prepared skull clearly referable to the genus *Corythosaurus* exhibits characters that appear to indicate its specific distinctness from the single known species, *C. casuarius* Brown, and the name *Corythosaurus excavatus* is therefore proposed for its reception. This specimen is of further interest as elucidating th ecranial structure, and it fully confirms Lambe's conclusions[1] regarding the homologies of certain bones in the skull of the crested hadrosaurs.

[1] *Memoir 120, Geol. Survey of Canada*, No. 102, Geol. Ser., 1920, pp. 70-76.

Corythosaurus excavatus, new species.

Plate 1, fig. 1.

Type: Catalogue number 13, University of Alberta; consists of the greater portion of a well preserved skull, but lacking the maxillary, lachrymal, jugal, quadratojugal and quadrate bones. Collected by George F. Sternberg, 1920.

Type Locality: Sand creek, Red Deer river, Alberta, Canada.

Horizon: Belly River formation, Upper Cretaceous.

The genus *Corythosaurus* now contains two species which may be distinguished by skull characters as follows:

Corythosaurus casuarius Brown.

Posterior border of crest regularly convex; greatest height of crest above center of orbit; premaxillary (prefrontal of authors) in contact at posterior extremity with nasal.

Corythosaurus excavatus, new species.

Posterior border of crest angularly concave, greatest height of crest posterior to orbit; premaxillary widely separated at posterior end from nasal.

The skull upon which the latter species is based has not been fully prepared at this time, the left side still remaining in the burlap-plaster covering as originally received from the field. From Mr. Sternberg's field notes it is learned that the left side is slightly more incomplete than the right, but, with the exception of the loss of bones enumerated above, the skull is in an excellent state of preservation.

The crest in *Corythosaurus excavatus*, as here interpreted, is formed

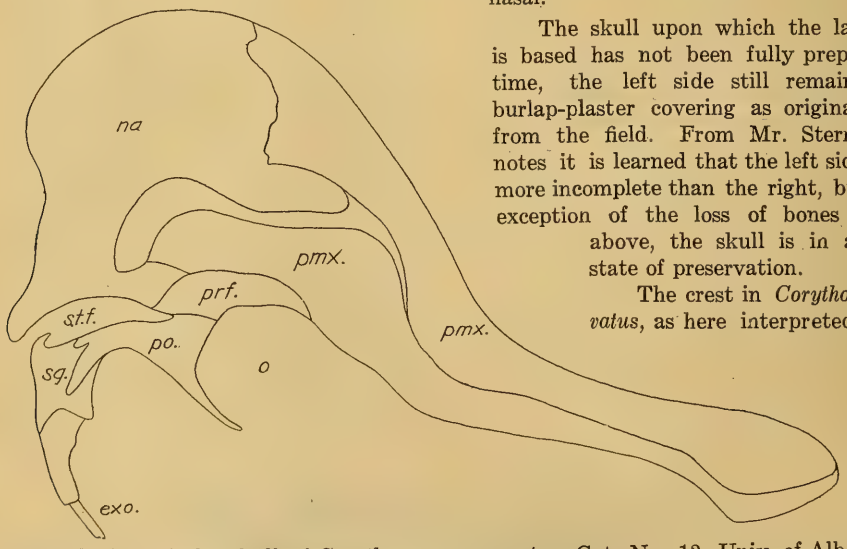


FIG. 1.—Lateral view of the skull of *Corythosaurus excavatus*, Cat. No. 13, Univ. of Alberta. Type. *exo.* exoccipital; *na.* nasal; *o.* orbit; *prf.* pre-frontal; *pmx.* premaxillary; *po.* postorbital; *sq.* squamosal; *stf.* supratemporal fossa. About one-seventh natural size.

by the premaxillary and nasal bones. The premaxillary forms the whole of the beak portion of the skull, and develops two strong processes posteriorly; an upper that rises with a somewhat gentler slope than in *C. casuarius* and divides the external nares into right and left openings, and meets the nasal above the center of the orbit; a heavier and longer lower process that extends backward below the elongated narial opening, but whose posterior extremity is not in contact with the nasal as in *C. casuarius*. (Compare figs. 1 and 2, pl. 1). This is regarded as one of the important structural differences signifying the distinctness of the two species here discussed.

The nasals form the entire upper and posterior part of the crest, with underlapping processes extending forward and in contact underneath with both the superior and inferior processes of the premaxillary as shown in figure 1.

The contour of the crest is strikingly unlike that of *C. casuarius* in the more receding facial slope which brings the highest point posterior to the orbit, whereas in the above mentioned species it is above the center of the eye; furthermore, the free posterior border is angularly concave, instead of regularly convex as in that species, and the thickened lower border projects backward above and parallel to the parietal, terminating as a narrowing but truncated process that slightly overhangs the squamosal bone. The lower anteriorly directed process of the nasal mentioned above has its pointed anterior extremity intercalated between the posterior process of the premaxillary and the prefrontal bones. Its forward end terminates above the posterior margin of the orbit.

The prefrontal may be roughly described as being a subtriangular bone that enters into the formation of the orbital rim about equally with the postorbital. It is wedged in between the postorbital and premaxillary and articulates posteriorly by an oblique underlapping suture with the nasal as shown in figure 1. In shape, position, and relationships to surrounding elements this bone closely resembles the so-called supraorbital in the genotype of *Chenosaurus tolmanensis* Lambe.[2]

The remaining bones of this side of the skull, the postorbital and squamosal, show no features distinguishing them from the homologous elements of the genotype described by Brown.

The supratemporal fossa is elongated anteroposteriorly and has a greatest diameter in this direction of about 122 millimeters.

The mouth, as in *C. casuarius*, is comparatively narrow, the premaxillary having a greatest estimated expansion of the beak portion of about 140 mm.

A study of this specimen corroborates in every way Lambe's[3] latest interpretation of the homologies of the cranial elements of the crested trachodont skulls, and it is now a well established fact that, no matter what fantastic shapes the skull may assume in the dinosaurian reptiles, the relationships of the elements forming the brain case remain constant. A similar nonappearance on the extreme dorsal surface of the frontal and parietal bones is to be found in the highly modified Ceratopsian skull, where they have been completely roofed over by the lateral elements, crowding in and joining on the median line above them.[4] Instead of a lateral shifting of the skull elements, in *Corythosaurus* there has been a development upward and backward of the bones of the face until finally the nasals reach a point overhanging the posterior end of the skull.

Comparative Measurements of Corythosaurus Skulls.

	C casuarius No. 5240 A. M.N. H.	*C. excavatus* No. 13, U. of A.
Complete length of skull between vertical lines..	812mm.	770mm.
Complete length of skull from beak to terminal end of crest.....	837	780
Vertical height of crest, from rim above center of orbit.....	284*a*	254
Greatest horizontal diameter of crest.....	392*a*	425
Length of skull, from posterior border of orbit to tip of beak.....	568*a*	585

a—measurements taken from illustration of skull.

A NEARLY COMPLETE SKULL AND RAMUS OF *Europlocephalus tutus* LAMBE.

Plates 2, 3, and 4, Fig. 1.

A well preserved skull and right ramus accompanied by other parts of the skeleton of an armored dinosaur in the University of Alberta paleontological collections, appears worthy of description. It contributes much to our knowledge of the cranium of this group, for with the exception of the type of *Panoplosaurus mirus* Lambe, only teeth, a fragmentary skull, and a few skin plates have thus far been described from the Belly River formation.

This specimen, Catalogue number 31, University of Alberta, consists of the skull, right ramus, two coössified rings of plates from the neck,

[2] *Ottawa Naturalist*, vol. 30, Jan., 1917, p. 120, pl. 6.

[3] *Memoir No. 120, Geol. Survey of Canada*, No. 120, Geol. Ser., 1920, pp. 69 to 76.

[4] Gilmore, Charles W., *Proc. U.S. National Museum*, vol. 55, No. 2260, 1919, pp. 104-107.

numerous detached dermal scutes, sacrum, right ilium, a few vertebræ and ribs. At this time only the skull and ramus have been prepared for study. The specimen was found by Mr. George F. Sternberg in 1921 in the badlands of the Belly River formation on the Red Deer river, Alberta, at a point about three-fourths of a mile southeast of Steveville, at an elevation of 225 feet (aneroid) above the level of the river.

I have identified this specimen as pertaining to the genus *Europlocephalus*, but before proceeding further it appears necessary to review briefly the status of the described forms from the Belly River fauna, in order that the reader may have before him the reasons for such a generic reference.

Named in chronological order the following armored dinosaurs have been recognized in the Belly River fauna:

Palæoscincus costatus Leidy,
Palæoscincus asper Lambe,
Europlocephalus tutus Lambe,
Panoplosaurus mirus Lambe.

Both species of *Palæoscincus* were established on teeth; *P. costatus*[5] on a tooth from the Judith River formation of Montana, and *P. asper*[6] from the Belly River formation of Alberta. *Europlocephalus tutus*[7] was described from a fragmentary skull, a coössified ring of neck plates, and other dermal ossifications.

Panoplosaurus mirus[8] was established on an adequate specimen consisting of a complete skull containing teeth, with much of the skeleton. It displays such marked differences both in skull and tooth structure from the other described forms, including the specimen now before me, that it may be dismissed from further consideration at this time.

Recently in a popular article Matthew[9] has announced that a specimen from the Red Deer river in Alberta, in the American Museum of Natural History collections, has "teeth identical with the *Palæoscincus* which Leidy described more than half a century before." This discovery is most important as making possible an adequate characterization of that genus, and will go far to straighten out some of the existing confusion in the synonymy of this group.

An examination of the illustrations of the *Palæoscincus* skeleton accompanying Matthew's article cited above shows the skull and dermal rings of the neck, in so far as they can be compared, to resemble closely the type of *Europlocephalus*, and it appears most probable that they are congeneric, and in that event *Europlocephalus* becomes a synonym of *Palæoscincus* which has priority by many years. From this brief review it is at once apparent that the authenticity of the genus *Europlocephalus* is very much in doubt, but its exact status can only be settled by an examination and comparison of the type materials. For the present, therefore, it must be continued as in good standing.

A comparison of the University of Alberta specimen with the description and illustrations of the rather unsatisfactory type of *Europlocephalus tutus* Lambe leaves but little doubt of their generic and specific identity. The skulls, in so far as they can be compared, are of practically the same size[10] and are covered with dermal ossifications of the same character and similarly arranged. Unfortunately none of the teeth were preserved with this specimen, so there is no way of comparing it with the species of *Palæoscincus* founded on teeth. Tentatively, therefore, I shall refer this specimen to *Europlocephalus tutus* Lambe and shall proceed with its description as further elucidating our understanding of this little known genus and species. In this connection it should be mentioned that I am fully cognizant of the many fine skulls and partial skeletons awaiting study and description in the American Museum of Natural History, New York, and which will undoubtedly straighten out much of the uncertainty now existing.

Description of the Skull.

The skull of *Europlocephalus*, as in all of these Upper Cretaceous armored dinosaurs, is greatly depressed. Viewed from above, (see pl. 2), it is wider than long and may be roughly described as being subtriangular in outline, slightly concave posteriorly and ending anteriorly in a broadly rounded muzzle. The anterior portion is strongly arched both antero-posteriorly and transversely, more especially in the former direction; between and behind the line of the orbits, nearly flat, even depressed on either side of the center. This surface terminates posteriorly as a short overhanging parietal crest.

Coössified plates completely cover the superior and lateral surfaces of the skull. On the median superior surface they are relatively small, irregularly five and six sided, and arranged with a greater or less degree of bilateral symmetry. On the top of the nose (see pl. 2) is a very large

[5] Leidy, J., *Proc. Acad. Nat. Sci. Phila.*, vol. 7, 1857, p. 72.

[6] Lambe, L. M., *Cont. to Can. Paleont., Geol. Survey, Canada*, vol. 3, Pt. 2, 1902, p. 54, pl. 17, fig. 5.

[7] *loc cit.* pp. 55-57, pls. 11, 12, 21, figs. 6, 7, and 8.

[8] Lambe, L. M., *Trans. Royal Soc. of Canada*, 1919, Sec. IV, pp. 39-50, 12 plates.

[9] Matthew, W. D., *Natural History*, vol. 22, No. 4, July-Aug., 1922, p. 334

[10] Attention should be called to the fact that the *Europlocephalus* skull which is illustrated by Lambe (Plate XI). *Contrib. to Can. Pal., Geol. Surv. of Canada*, vol. III, Pt. 2, 1902, as being of natural size is very much under that according to his measurements; see p. 57.

irregularly rounded median plate, having a low rounded central prominence. This plate, because of its size, stands out rather conspicuously from the others. A plate of nearly equal size, but apparently lacking the central prominence, occupies a similar position in the type of *Euoplocephalus tutus* Lambe.[11] *Ankylosaurus* also has a single central plate in front, but it is greatly elongated transversely, extending nearly the whole width of the muzzle.[12] It apparently is coequal in extent to the two distinct, transversely elongated pentagonal plates that immediately precede the large central ossification described above in the specimen now before me. These meet on the median line, and largely fill the space between the azygos plate and the posterior border of the nares (see pl. 3, fig. 2).

Above each orbit is a moderately large ridged plate, having a sharp-edged, pointed process that projects upward and outward above the eye, and which stands out much more conspicuously than in the allied *Ankylosaurus*. This element is missing, along with much of the rest of the posterior half of the skull of *Euoplocephalus* described by Lambe. Immediately preceding the above plate is a smaller one that develops a low, roughened dorsal keel. Its homologue appears to be present on the left side of Lambe's fragmentary skull. Each posterior external angle of the skull is ornamented by a large, subtriangular spine-like plate that extends upward and forms a conspicuous feature of the superior aspect, as in *Ankylosaurus*. It differs from that genus, however, in having its apex directed more vertically.

The median posterior border is ornamented by two small node-like scutes developed on either side of a smooth median space, as is well shown in Plate 2. These slightly overhang the posterior border.

On the posterior inferior angles are two enormous plates that send downward and outward flattened triangular processes whose apices mark the widest part of the skull. This process completely hides the quadrate and its articulation with the lower jaw from a lateral view, and furnishes ample protection for it. The external surface is broadly convex fore and aft, with a tendency toward the tip to turn upward. On the internal side it is deeply excavated, except its lower third, which presents a flattened triangular face, that looks more downward than inward. The lower part of this process extends some 30 millimeters below the level of the articular ends of the quadrates.

[11] *Contrib. to Can. Paleont., Geol. Surv. of Canada*, vol.3, pt. 2, 1902, pl. 11.

[12] Brown, Barnum, *Bull. Amer. Mus. of Nat. History*, vol. 24, 1908, Art. 12, figs. 1, 2, p. 189.

The nearly vertical lateral surface between the orbit and the nares is covered by three large plates that are higher than wide. These plates have incipient longitudinal keels. The two anterior ones extend slightly over on to the superior surface.

The plates on the dorsal aspect are defined by deep circumscribing grooves, but as in *Ankylosaurus* the demarcations are less distinct on the posterior median areas, as is shown in Plate 2. The edges of the plates are usually angular and sometimes raised with the center depressed. Some few have incipient keels or rounded nodes. The surfaces of nearly all are roughly pitted and covered with vascular grooves, but nowhere do I find cross-hatching suggestive of the structure found in *Nodosaurus*, and noted by Lambe in the type of *Euoplocephalus tutus*.

The orbits are placed far back as in *Panoplosaurus*[13] and are suboval in outline, with the longest diameter directed antero-posteriorly (see fig. 1, pl. 3). The diameter of the orbit antero-posteriorly is 62 mm.; dorso-ventrally about 32 mm.

The external nares are large, greatly elongated transversely, and look almost directly forward. Their inner borders are separated at the center by a bridge of bone 40 mm. wide. A narrow, but raised, rugosely roughened rim of bone strongly outlines their upper and external borders, while the inner and lower sides are bordered by a wider but less rugose band. The remaining anterior surface extending down to the subacute, non-dentigerous edge of the premaxillaries, is smooth.

On the palatal surface the limits of the premaxillary bones, which meet by a strong suture at the center, are clearly defined. They form the whole of the broadly rounded muzzle below the nares, broadly separating the maxillaries at their anterior ends and joining the slender, elongated vomers at the center. Viewed from below the anterior ends of the premaxillaries curve sharply downward, terminating in a thin sharp cutting edge that is broadly rounded from side to side. This edge meets, and is continuous laterally with, a heavier but sharp-edged plate of the maxillary. The latter extends well below and completely hides the anterior dentigerous border of the maxillary from a lateral view, but, proceeding posteriorly, this ridge subsides and merges into the wide, rounded, lateral surface that is on a level with the posterior part of the maxillary tooth row.

The tortoise-like beak was probably covered with chitinous horn and its sharp cutting edges no doubt made a very efficient cutting beak for nip-

[13] Lambe, L. M., *Proc. and Trans. Royal Soc. of Canada*, Sec. IV, vol. 13, 1919, pl. 4.

ping off the vegetation upon which this animal subsisted.

None of the teeth were preserved with this skull, and neither can the exact number that were borne by the maxillary be determined, though it is evident that the tooth row was not less than 90 mm. in length. The withdrawal inward of the dental series away from the lateral cutting plate described above is one of the striking peculiarities of this beast.

The much reduced pterygoids are seen to join the quadrates behind and the vomers in front but the remainder of the palate and occiput in this specimen has been so much restored that it offers very little reliable information.

Measurements of the Skull.

	mm.
Greatest length over all, median line	370
Greatest breadth over all, to tips of lateral processes	455
Greatest breadth across upper posterior end	274
Greatest breadth across center of orbits	323
Greatest breadth across anterior external border of nares	64
Height from lower edge of mandible to level of center of top of skull, about	170
Distance between anterior border of orbit and anterior extremity of nose at center	237
Height of skull, taken at a point half way between orbit and muzzle	130
Distance between posterior border of orbit and posterior extremity of skull	132
Height of skull from tip of distal external process to border of superior surface, about	170
Distance between quadrates at center of articular ends	240

Lower Jaw.

The right ramus is completely preserved and on the internal side, at least, gives a fairly clear conception of the extent and arrangement of its constituent elements (see fig. 1, pl. 4). Much of the outer and lower surfaces of the ramus, however, except posteriorly, and the upper and anterior portions of the dentary are covered by what appears to be a single large dermal plate. It is of elongate proportions, thin above and thickened below, and effectually conceals most of the mandible elements from a lateral view. On its lower external side is developed a sharp-edged longitudinal keel that projects directly outward in relation to the longer axis of the jaw. Its greatest lateral extent is slightly in advance of the line of the coronoid process.

The ramus is deepest at about one-third of its length from the back, gradually narrowing to the forward end of the tooth row, whence it rapidly narrows as it turns strongly inward toward the median line, forming a spout-like symphysial end where it joins the predentary (see pl. 3, fig. 2).

The postcoronoidal part of the jaw is very short, as in many of the other predentate Dinosauria. The dentary forms the anterior two-thirds of the ramus. The dentigerous portion of the dentary extends free and well above the overlying dermal plate and on its external surface is perforated by a row of very large foramina. There are alveoli for twenty-one small teeth, which occupy a space 105 mm. in length. Viewed from above, the tooth row bends slightly outward toward the front, and is gently arched downward at the front. On the dorsal surface the dentary is produced backward as a slender process which overlaps the anterior end of the surangular, and whose posterior pointed termination reaches a point external to, and opposite the center of, the coronoid process. Meckel's groove is covered over by the splenial, except for an elongate mandibular foramen opening on the internal side below the anterior end of the alveolar border.

The coronoid, which can be quite clearly outlined as shown in Plate 4, fig. 1, has a distal spatulate end that is applied to the inner posterior end of the dentary and is in contact anteriorly with the splenial and posteriorly with the prearticular. The upper contracted portion extends backward and upward, terminating in a pointed extremity that rises above the border of the surangular against which it abuts below. The coronoid is confined exclusively to the internal side of the ramus, there being no anterior external process developed, such as is found in so many reptilian forms. Its posterior median border forms the anterior boundary of the large rounded mandibular fossa. The suture between the surangular and angular is entirely obliterated. The surangular portion, however, contributes slightly to the formation of the cotylus by sending inward a horizontal projection that laps the articular. The outer superior border presents a sharp edge that extends upward to meet the coronoid above the center of the mandibular fossa.

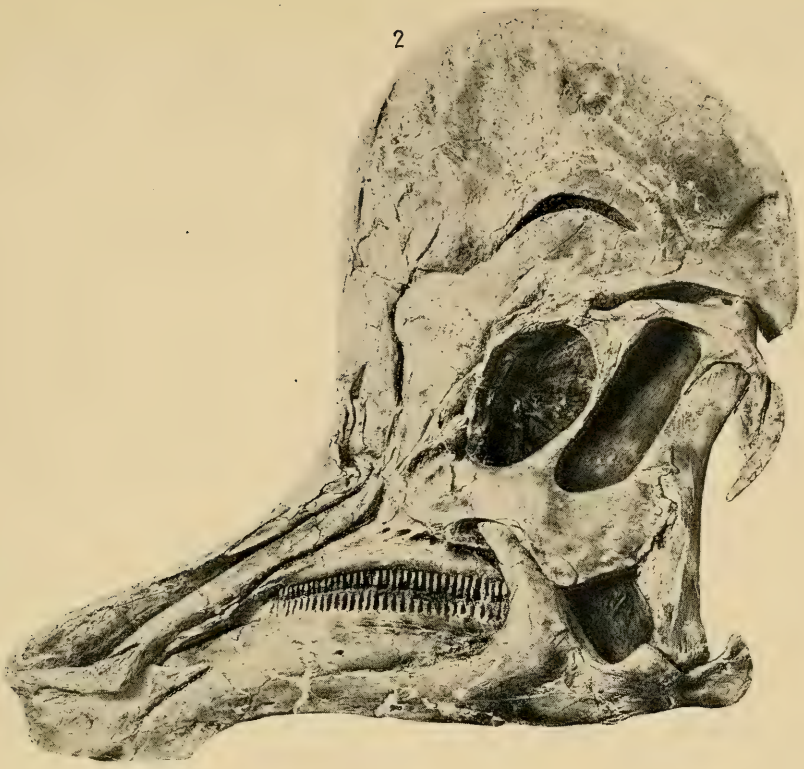
Posteriorly there is a rapid constriction in the depth of the jaw, brought about by the downward inclination of the surangular and the upward inclination of the posterior edge of the dermal plate. The articular is relatively small and its articular surface is much inclined, looking upward and outward. This articular face reaches nearly to the obliquely truncated posterior end of the ramus. The prearticular part of the articular extends forward and outward to meet the coronoid at the front of the fossa.

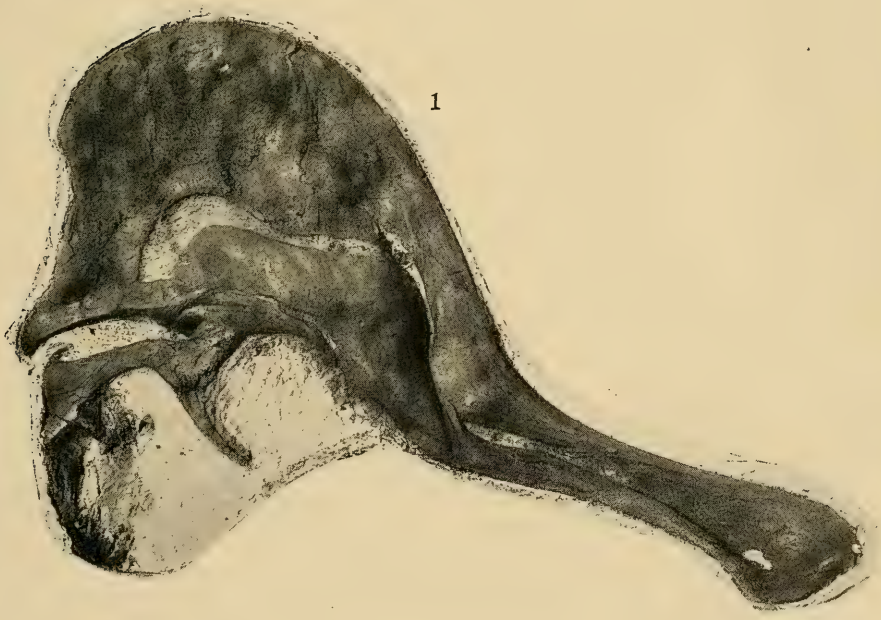
EXPLANATION OF PLATES

PLATE 1.

FIG. 1. Skull of *Corythosaurus excavatus*. Type No. 13, University of Alberta. Viewed from the right side.

FIG. 2. Skull of *Corythosaurus casuarius* Brown. Type No. 5240 A.M.N.H. Viewed from the left side. After Brown. Both figures one-seventh natural size.





Skulls of *Corythosaurus*

PLATE II.

Skull of *Europlocephalus tutus* Lambe. No. 31, University of Alberta. Viewed from above. About one-fourth natural size.



Skull of *Euoplocephalus tutus* Lambe

PLATE III.

FIG. 1.—Skull and right ramus of *Europlocephalus tutus* Lambe. No. 31, University of Alberta. Viewed from the right side.

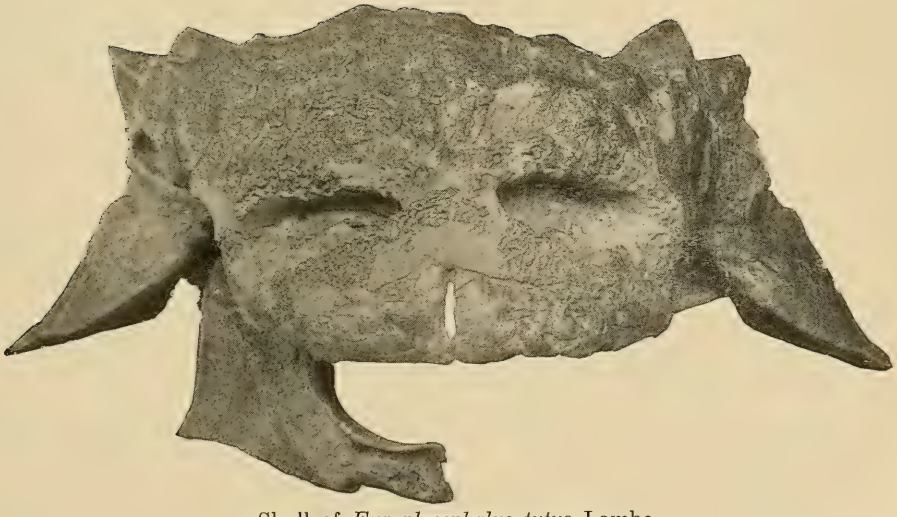
FIG. 2.—The same. Viewed from the front.

Both figures about one-fourth natural size.

1



2



Skull of *Europlocephalus tutus* Lambe

PLATE IV.

FIG. 1 —Right ramus of *Europlocephalus tutus* Lambe. No. 31, University of Alberta. Viewed from the internal side. About one-half natural size.

FIG. 2.—Dorsal vertebra of an extinct lizard. No. 112, University of Alberta. Ventral view.

FIG. 3.—The same. Dorsal view.

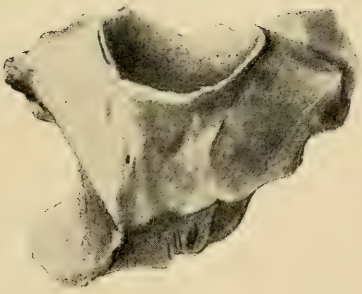
Both figures natural size.

[Illegible]



Right ramus of *Europlocephalus tutus* Lambe

2



3



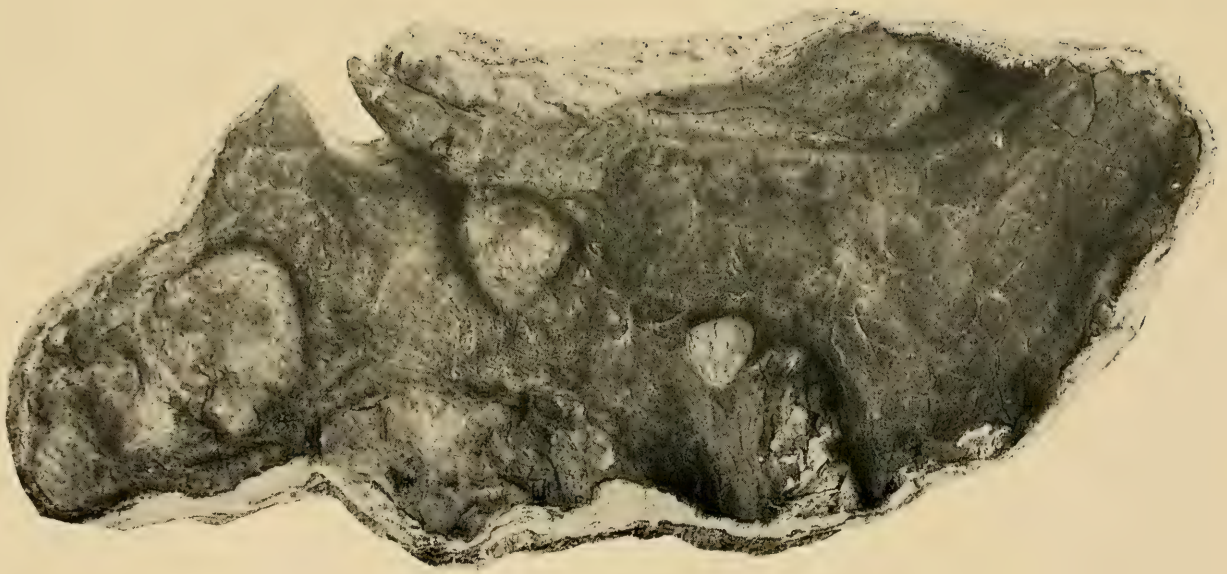
Dorsal vertebra of an extinct lizard

PLATE V.

Skull of *Eoceratops* sp. No. 40, University of Alberta.

Viewed from the left side. About one-seventh natural size.

PLATE V



Skull of *Eoceratops* sp.

Measurements of ramus.

	mm.
Greatest length of ramus in straight line	260
Greatest depth below coronoid process	92
Greatest depth at center of tooth row	78
Greatest depth at symphysial end	30
Length of precoronoidal part of jaw	200
Length of postcoronoidal part of jaw	60
Width of ramus across center of cotylus	44

NOTES ON A CERATOPSIAN SKULL OF THE GENUS *Eoceratops*.

Plate 5.

A partially prepared but nearly complete Ceratopsian skull in the University of Alberta paleontological collection (see pl. 5) is of interest as exhibiting a phase of skull development somewhat different from any before observed in a member of this group of the Dinosauria.

It is not my intention to describe this skull in its present unprepared state, but simply to call attention to some few features of the cranial structure in order to place the specimen on record and thus make it available to future students of the Ceratopsidæ.

This specimen, Catalogue number 40, University of Alberta, was collected in 1920 by Mr. George F. Sternberg, two miles southeast and one mile east of the mouth of Sand creek, Red Deer river, Alberta, Canada. It was found lying on its left side and associated with other parts of the skeleton, but only a few bones of the latter were sufficiently well preserved to be worthy of preservation.

The skull is somewhat compressed from side to side and the posterior portion of the frill is missing, as may be seen in Plate 5. That the specimen was fully adult appears to be indicated by the coalescence of most of the cranial sutures. Viewed from the side, the short deep nasal region with small upturned nasal horn; the subcircular, tapering, slightly recurved postorbital horn core, and the triangular squamosal having the dimensions of the type, are all features found in *Eoceratops canadensis* Lambe.[14] to which genus this specimen is provisionally assigned. The presence of epioccipital bones on the border of the squamosal and indications that the fontanelles in the frill were entirely within the dermosupraoccipital (parietal of authors) are features opposing such an assignment. The differences observed in the inclination of the postorbital horns between those of the present specimen and the type I do not regard of importance, because of the apparent depression of the horn cores by postmortem crushing, in the University of Alberta specimen, and the chance of error in angulation in Lambe's interpretation of the proper articulation of the fragmentary skull parts constituting the type specimen. Resemblances found in the anterior portion of the skull in front of the orbits, combined with the presence of epioccipitals and fenestra within the dermosupraoccipitals strongly suggest affinities with the genus *Chasmosaurus*[15] but the relatively smaller size of the skull now before me and differences in the proportions of the squamosal, combined with the different postorbital horn structure are opposed to such an identification.

Lambe in his diagnosis of the genus *Chasmosaurus*[16] observes that the squamosal is "more than three times as long as broad", whereas in the University of Alberta specimen, the most generous estimate of the complete length of this bone could not make it more than a little over twice the width. The postorbital horn cores in their general length and taper are also suggestive of the genotype of *Ceratops montanus* from the Judith River formation of Montana (No. 2411, U.S. National Museum), but the horns of that form curve slightly forward and strongly outward[17], and, as Lambe has pointed out, the "concave curve is on the outer side of the core", whereas in the present specimen it is on the back side.

It may be observed that while horn cores and other outgrowths on the Ceratopsian skull have been extensively used for distinguishing genera and species, it is not yet clear how much dependence can be placed on these highly specialized structures for such differentiation. We already know that these various outgrowths of the skull are subject to considerable variation in individuals of the same species, and it is also necessary to take into account differences that may be due to age and sex. While the present specimen when fully prepared may be found to represent a new form of the horned Dinosauria, it appears best for the present at least, on account of the resemblances pointed out above, to refer it to the genus *Eoceratops*.

In order that there may be a more universal procedure among paleontologists in the designation of certain cranial elements in the Ceratopsia, I wish to protest against the continued use of the term *parietal* for the median element of the frill. Hay[18], Brown[19] and Gilmore[20] have all shown that the parietal does not appear on the dorsal surface of the skull, and while there may be some difference

[14] Lambe, L. M., *Bull. No. 12, Geol. Survey of Canada, Geol. Ser.*, No. 24, 1915, Pl. 1.

[15] Lambe, L. M., *Contrib. to Can. Pal., Geol. Surv. of Can.*, vol. 3, Pt. 2, 1902, pp. 66-67, pl. 20, figs. 1, 2.

[16] *Op. cit.*, p. 17.

[17] Hatcher, J. B., *Monograph U.S. Geol. Survey*, vol. 49, 1905, p. 100.

[18] Hay, O. P., *Proc. U.S. Nat. Museum*, vol. 36, 1909, p. 37.

[19] Brown, Barnum, *Bul. Amer. Mus. Nat. History*, vol. 33, 1914, p. 543.

[20] Gilmore, C. W., *Prof. Paper 103, U.S. Geol. Survey*, 1917, p. 12.

of opinion as to the true homologies of this bone, it certainly cannot be the parietal, and, temporarily at least, it appears best to follow either Huene[21] who designated it *dermosupraoccipital*, or Hay, who termed it supratemporal. The supraorbital horn core could also more appropriately be called postorbital, since in *Brachyceratops*[22], a juvenile skull, having all of the sutures of the cranium clearly distinguishable, it is the latter bone which gives rise to this horn-core and it would therefore appear that postorbital horn is the more appropriate designation.

Measurements of Skull.

	mm.
Greatest length of skull, estimated about...	1200
Width of squamosal, widest part.....	280
Height of postorbital horn above superior border of orbit.....	170
Antero-posterior diameter of horn at base..	65
Height of skull from border of alveolus to tip of nasal horn, about.....	320

ON THE FIRST OCCURRENCE OF A LACERTIAN REPTILE IN THE BELLY RIVER FORMATION.

Plate 4, figs. 2 and 3.

A dorsal vertebra, Catalogue number 112, University of Alberta, lacking the condylar end of the centrum, the left posterior zygapophysis and the spinous process, shows for the first time the presence in the Belly River fauna of a true lacertian reptile. This specimen was found associated with a miscellaneous lot of materials, among which were recognized vertebrae of *Champsosaurus*, a claw of an ornithomimid dinosaur, teeth of a crocodilian, and a tooth and footbone of a small carnivorous dinosaur. This assemblage of fossil bones was collected by Mr. George F. Sternberg, September 29, 1921, at Sandy Point, southwest of Empress, South Saskatchewan river, Alberta, Canada.

The vertebra bears a striking resemblance, both in size and form, to those of the genus *Saniwa*. A full description and comparison of this interesting specimen will be given later in a monographic study, *The Fossil Lizards of North America*, a work which is now in preparation.

At this time the importance of the specimen lies in the fact of its being the first true member of the suborder Sauria to be discovered in the Belly River formation. It should be mentioned that the genus *Troödon* of the Judith River and Belly River formations, formerly referred by Leidy, Lambe and others to the Lacertilia, is now known to pertain to the Dinosauria.

[21] Huene, F. V., *Neues Jahrbuch*, Band 2, 1911, pp. 150-156, figs. 3-6.

[22] Gilmore, C. W., *Op. cit.*, p. 11.

SUPERHEATING FOR HOUSEHOLD PESTS

By NORMAN CRIDDLE, Entomological Branch, Ottawa

THE insects inhabiting dwellings are varied in kind and frequently obnoxious in character. Some, like the loathsome bedbug, are parasites upon man; others infest his stored products or destroy his clothing and carpets. Meal moths, clothes moths, carpet beetles, larder beetles, meal worms, rice weevils, cockroaches and several more may be met with in nearly any part of Canada. Indeed, the majority are cosmopolitan in their distribution and have been man's unwelcome guests from time immemorial.

The prescribed remedies for household pests are as varied as the insects themselves and some of them date back to a very early period in history. Astrology, charms, and spells, have all had their innings as measures of control and the results have been hailed by their several votaries as eminently successful. We, in this scientific age, require a more practical demonstration of efficiency before we are ready to adopt the recommendations of either ancient or modern workers. For that reason careful studies have been made to discover the best methods of control. Eliminating the impractical, there remain several useful remedies for keeping household insects under control. Cleanliness is the first requisite and is always desirable, and systematic attention to this factor alone will do much in the initial stages; indeed it is a necessary adjunct to success at all times. One of the most promising of recent discoveries in combating household pests is that known as super-heating. Its success, to date, has been very encouraging and its more general application is fully warranted by the results already secured.

Superheating consists of raising the temperature of a dwelling, or room, to a point where insect life can no longer exist. To accomplish this end a heat must be attained exceeding 120°F. and be retained for at least six or seven hours. The recommendations given below are based on experiments carried on by members of the Entomological Branch.

First of all, it is necessary to provide the means of heating. In an ordinary dwelling this can be done with the furnace, providing a day be chosen in summer time when the outside atmospheric temperature is already high. Should additional heat be required, however, heating

apparatus suitable for the conditions must be provided in whatever way is most convenient. Before beginning operations, see that all chimenys are clean and otherwise safe. Then remove from the rooms to be superheated all inflammable material such as oils, fats and liquids, as well as any other articles liable to suffer from heat. See that the windows are tightly closed and attach storm windows when they are available; have water or some other fire extinguisher available for instant use but do not keep any form of moisture in the rooms to be heated because it has been found that dry heat has greater penetrating powers and kills the insects more readily than does moist heat. Move all heavy furniture away from the walls but do not disturb bedding, clothes or any light articles. With the above preparations all is in readiness to set the fires going.

Providing the day is propitious, heating should be commenced as soon as possible in the morning and under correct methods of application the temperature ought to have attained 125°F. within an hour. The temperature should not be permitted to go above 145°F. at a position two feet above the floors. About an hour after the temperature has reached 125°, enter the room or rooms and lift up all carpets, mattresses, etc., in order that the heat may get underneath them. If the pest to be combatted is the bedbug, remove or disturb pictures or clothing hanging on the walls. Clothes closets should be emptied so that the heat may have access to them and every other means adapted to ensure the heat penetrating into all cracks and crannies present. The reason for moving the lighter articles after the rooms are heated up is to prevent the insects from leaving them and obtaining shelter elsewhere, possibly in the floors, which are most difficult to heat. By waiting until the rooms are hot such insects that may be present are destroyed before they have time to escape. It is advisable, however, not to remain in the heated room more than a few minutes at a time, for, though we have never known any serious consequences to follow, it is wise to take no unnecessary risks, the heat to some people often proving very overpowering. The shifting of light articles such as those mentioned above should be repeated once or twice during the period until all visible life is dead.

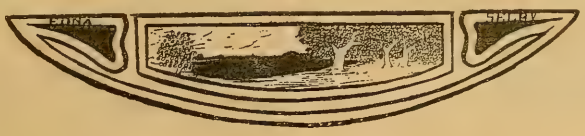
We advise at least six but preferably seven hours for the successful super-heating of a dwelling and should suggest even a longer period than seven hours if it can be conveniently arranged. At the completion of the operation all windows and doors should be opened to permit the place to cool down quickly but as the walls will retain the heat for several hours it is not advisable to occupy the bedrooms that night if other sleeping places are available.

To be thoroughly efficient the practice of superheating should be repeated in the course of a few weeks in order to destroy the few remaining insects that have escaped the first treatment. Such survivors will be very few in number and may pass unnoticed until they begin to multiply but it is seldom that all life is killed with one heating.

I do not think that any one would regret testing out this method of destroying household insects, particularly in a country boarding house or dwelling infested by bedbugs. The effect of treatment is little short of magical. To move a mattress during the process of treatment and to see the insect spin around in circles before dying is a revelation to the unenlightened, to say nothing of the joy it brings to the owner of the house. Clothes moths and carpet beetles are destroyed as readily as bedbugs. The moths perish in the darkness of cupboards, closets, etc., while the beetles make their way to the windows where they die during their efforts to escape.

A household "clean-up" follows as a natural sequence to superheating. It is then that the final touches may be added which will prevent a repetition of the insect outbreak. A little paint here and there, the stopping of a crack or the dusting in of a little fresh pyrethrum powder into crevices may be recommended at this time as a final precaution. In any case the rooms treated will remain practically free from insect troubles for a year and this in itself is surely worth a couple of days' work.

In conclusion it may be pointed out that poultry houses infested by mites, etc., are as easily cleaned of them by superheating as are dwellings of their objectionable inhabitants, providing, of course that the building be reasonably air tight and the heat can be maintained.



BIRDS OBSERVED IN YOHO PARK, B.C., IN AUGUST, 1922

By TITUS ULKE

Note: Subspecific indentifications in this paper were kindly worked out by Dr. Harry C. Oberholser in accordance with the known ranges of the forms in question.

WESTERN GREBE (*Aechmophorus occidentalis*).—Pair on Emerald Lake, B.C., in August. Other Grebes noted but not identified.

HERRING GULL (*Larus argentatus*).—A Gull, probably this species, observed on Wapta Lake.

WESTERN HARLEQUIN DUCK (*Histrionicus histrionicus pacificus.*)—Five, all females or young apparently, observed August 29, 1922, on Wapta Lake. Probably breed on the lake. About 3 dozen reported on the lake in May and June, 1922, and several times seen sailing down the rapids of the upper stretches of the Kicking Horse River. Other Ducks not identified.

GREAT BLUE HERON (*Ardea herodias herodias*)—Stephen Lake.

SPOTTED SANDPIPER (*Actitis macularia*).—Kicking Horse River near Field, B.C.

RICHARDSON'S GROUSE (*Dendragapus obscurus richardsoni*).—On Trilobite trail above Field, July 30, 1922, female with 3 young at about 6,000 feet elevation.

FRANKLIN GROUSE (*Canachites franklini*).—Edge of woods near Deer Lodge Cabin, August 25. Paradise Valley trail August 28. A handsome male leisurely picked up stray oats within 2 feet of where I stood.

SOUTHERN WHITE-TAILED PTARMIGAN (*Lagopus leucurus altipetens*).—Five observed and photographed on shale slide on Mt. Stephen at an elevation of about 9,000 feet on August 2.

WESTERN MOURNING DOVE (*Zenaidura macroura marginella*).—Leanchoil, August 24.

PIGEON HAWK (*Tinnunculus columbarius columbarius.*)—Near Leanchoil, B.C. Other Hawks not identified.

SHORT-EARED OWL (*Asio flammeus flammeus*).—Several seen on the Hoodoo trail near Leanchoil, August 18.

BELTED KINGFISHER (*Streptoceryle alcyon alycon*).—Ice River, August 19.

NORTHERN PILEATED WOODPECKER (*Phlœotomus pileatus picinus*).—Borings noted in Douglas fir, August 19, on Ice River trail.

RED-SHAFTED FLICKER (*Colaptes cafer collaris*)—Sherbrooke Lake trail, August 28.

POOR-WILL (*Phalænoptilus nuttalli*).—Burgess trail, 8,000 feet, July 30.

RUFOUS HUMMINGBIRD (*Selasphorus rufus*).—Field, August 15.

WESTERN WOOD PEWEE (*Myiochanes richardsoni richardsoni*).—Field, July 29.

BLACK-HEADED JAY (*Cyanoccitta stelleri annectens*).—Three noted on Yoho road about 9 miles north of Field, August 9.

ROCKY MOUNTAIN JAY (*Perisoreus canadensis capitalis*).—Burgess Pass trail, August 5. Ice River trail, August 18.

RAVEN (*Corvus corax sinuatus*).—East of Stephen, August 1.

WESTERN CROW (*Corvus brachyrhynchos hesperis.*).—Field, August 8.

CLARK NUTCRACKER (*Nucifraga columbiana.*)—Field, August 29.

COWBIRD (*Molothrus ater*).—Field, August 26. Deer Lodge Cabin, August 20.

THICK-BILLED REDWING (*Agelaius phoeniceus* prob. *fortis*).—Ottertail road, August 9.

ROCKY MOUNTAIN PINE GROSBEAK (*Pinicola enucleator montana*).—Emerald Lake. Field, August 2, singing in a dead tree.

GRAY-CROWNED LEUCOSTICTE (*Leucosticte tephrocotis tephrocotis*).—Half a dozen noted on slide, 8,000 feet, on Mt. Stephen, August 2. Burgess Pass, August 8.

PINE SISKIN (*Spinus pinus pinus*).—Very common about the hotel at Field throughout August.

WESTERN CHIPPING SPARROW (*Spizella passerina arizonae*).—Field, August 5.

WHITE-CROWNED SPARROW (*Zonotrichia leucophrys*).—Ottertail trail, August 9.

JUNCO (*Junco oreganus* prob. *montanus*).—Nest with 5 young in mossy bank alongside Burgess trail, about 5,000 feet in elevation, July 30.

ROBSON SONG SPARROW (*Melospiza melodia inexspectata*).—Wapta Lake, August 29.

TREE SWALLOW (*Iridoprocne bicolor*).—Field, August 15.

BOHEMIAN WAXWING (*Bombycilla garrula pallidiceps*).—Abundant near Field, August 8.

PILEOLATED WARBLER (*Wilsonia pusilla pileolata*).—Specimen found on Ottertail road, July 28. Other Warblers not identified.

PIPIT (*Anthus spinoletta rubescens*).—Sherbrooke Lake trail, August. 28.

WATER OUZEL (*Cinclus mexicanus unicolor*).—Cataract Falls, near Wapta Lake, August 15.

CATBIRD (*Dumetella carolinensis*).—Field, August 10.

WESTERN WINTER WREN (*Nannus hiemalis pacificus*).—Yoho road, 7 miles from Field, August 9.

RED-BREASTED NUTHATCH (*Sitta canadensis*).—Burgess Pass, August 5. Ice River trail, August 20.

SHORT-TAILED CHICKADEE (*Penthestes gambeli abbreviatus*).—Ottertail Road. Ice River trail. Throughout August.

RUBY-CROWNED KINGLET (*Corthylio calendula calendula*).—Yoho road, 9 miles from Field, August 9.

WILLOW THRUSH (*Hylocichla fuscescens salicicola*).—Trilobite trail above Field, singing, August 3.

AUDOBON HERMIT THRUSH (*Hylocichla guttata auduboni*).—Trilobite trail above Field, August 9.

WESTERN ROBIN (*Planesticus migratorius propinquus*).—Field, throughout August.

MOUNTAIN BLUEBIRD (*Sialia currucoides*).—About Field throughout August.

BOOK REVIEW

HANDBOOK OF INDIANA GEOLOGY. By W. N. Logan, E. R. Cummings, C. A. Malott, S. S. Visher, W. M. Tucker, and J. R. Reeves. *Publication No. 21, 1922, pp. 1120, figs. 137, pls. 178, 3 maps in pocket. The Department of Conservation, State of Indiana, Indianapolis.*

The State of Indiana has published under the above title a contribution to regional geology which in its plan and scope may well serve as a model to other states and provinces.

The official reports on the geology of the State of Indiana show a wide range in the quality of work represented. They start with the brief preliminary report of D. D. Owen, one of the most distinguished of the small band of pioneer geologists who began nearly a century ago the stupendous task of deciphering the geology of the continent. Owen was called to other fields and his preliminary report published in 1839 was followed by a long series of reports by the State geologist which represent all degrees of merit and demerit. Geological investigation in the State during the long interval between 1839 and 1922 shows what might be termed a series of diastrophic oscillations in which reports on the work done rise sometimes high above and again sink far below the sea of mediocrity.

The volume recently issued by the Department of Conservation under the title of Handbook of Indiana Geology represents one of the high-level epochs in the geological work of the State. The State geologist, Prof. W. N. Logan, and five other geologists, four of whom are members of the faculty of Indiana University, are responsible for this encyclopedic work. After eighty-odd years of geological work in the State, covering all sorts of geological problems in all kinds of ways, the need for a comprehensive work of this character is evident and examination of this portly volume shows that it has been adequately met. In it the gist of a large part of the important work which has been accomplished in the State has been brought together in brief and orderly form, as well as many new data.

This volume opens with a section on the geography of Indiana by Dr. S. S. Visher. The skillful presentation of the statistical facts by diagrammatic maps and graphs so that the eye grasps their important relative significance at a glance is an important feature of this portion of the volume. This graphic method of presenting geographic statistics, now extensively employed by geographers, has transformed a once deadly dull subject into one of absorbing interest. Professor Visher's graph showing the growth of such Indiana cities as Evansville and Fort Wayne between 1850 and 1920 may furnish almost as many thrills as a horse race. These two cities coming under the 1920 line almost neck and neck, with Gary shooting up rocket-like to the same line, leave the reader trying to pick the winner and wishing for the next census reports. The map showing the early highways, the canals and the first railways of the State is one of the most interesting maps used in this excellent presentation of Indiana geography. The writer regrets the omission of footnote or bibliographic references to sources of information concerning Indiana geography in other reports of the State geologist. The reader might well have been reminded, for example, that there is a map in one of the old reports of the State geologist giving the Indian names of most of the larger rivers and streams of Indiana. As the State grows older and wiser it may come to appreciate and wish to adopt some of these musical old Indian names.

The section on Physiography by Professor Clyde A. Malott deals in a very satisfactory way with a subject which has generally been treated in a fragmentary manner in Indiana. Physiographic, topographic and glacial maps of the State are valuable features of this part of the work. The topographic map has a contour interval of 100 feet and is the first contour map of the entire State which has been made. Other maps show such curious features as the dry channel of Lost River

and the drainage system of Big Creek which rises within gun shot of the Ohio and flows directly away from it for nearly forty miles before joining it. The reader is also introduced to the great underworld of the limestone subsurface drainage system. He learns of streams which practice piracy underground and of rivers with leaky bottoms which manage to stay on the surface only in times of flood. The author discusses in this section a host of interesting drainage problems which must arouse the interest of the amateur as well as of the professional geologist. A carefully worked out system of nomenclature has been applied to the main physiographic features of the State.

From the pages on Hydrology by Dr. W. M. Tucker the reader may learn all that the title would suggest and even more about the waters of the State. The writer does not recall having previously seen the subject of irrigation in Indiana, which is taken up by Dr. Tucker, discussed. Flood control, city water supply, and sewage disposal are among the subjects treated which give value to this paper. The chapter on lakes and the bibliography at the end of the paper it may be noted fail to make any reference to Blatchley and Ashley's work on the northern Indiana lakes which is the most important piece of work which has been done on them.

Part IV of this volume deals with a very fundamental portion of the Handbook—the geologic chronology of the State. Professor Cumings' reputation as a stratigraphic palæontologist will lead the experienced geological reader to expect a thorough piece of work in this section and he will not be disappointed. The bibliography dealing with the stratigraphy and fossils of the State occupies thirty-six pages. The formidable task of critically summarizing the most pertinent data in the several hundred papers represented in this extensive literature is one that very few geologists could successfully undertake. Professor Cumings' intimate knowledge of the fossil-faunas of Indiana has enabled him to review critically the mass of literature relating to the many geologic formations of the State in an admirable manner. His detailed tracing of the history of each of the fifty-eight formation names establishes a sound basis for a stable nomenclature. This careful review of the Indiana formational nomenclature will be of much value to the geologists of adjacent states as well as to those of Indiana. All geologists concerned with the nomenclature of geologic formations will wish to examine Professor Cumings' proposals regarding the substitution of Medinan for Oswegan. This and other modifications suggested by Professor Cumings will doubtless produce various reactions on the part of geologists, depending on their geographical location and previous condition of intellectual mobility.

Nearly half the volume deals with the economic geology of the State. This portion, with the exception of a well illustrated paper on the oil shales by Mr. John R. Reeves, is the work of Professor W. N. Logan. Numerous maps, diagrams, and illustrations help the reader to a clear understanding of the extent, manner of occurrence, and quality of the State's mineral resources. A convenient-sized geological map of the State, an oil and gas map and a coal map are valuable features of this part of the report. Professor Logan's treatment of Indiana's mineral resources is probably as comprehensive as the space limitations permit. It is of course not possible to compress into the thirteen pages devoted to coal all of the mass of data in the 1700-page report of Dr. Geo. H. Ashley on the coal of the State. In this and other sections of the volume the reader should bear in mind that a chief function of the handbook is to serve as a guide to the results and reports of earlier workers in this field. The bibliographic lists following the several chapters are useful in this way but they are not as full as they might well have been. In the section on building stones, for example, the reader should have been advised if specially interested in the Bedford stone to read the maps and reports of Hopkins and Siebenthal. Coal, building stone, cement clays, and other important mineral resoucres are among the subjects dealt with in this section. Such relatively little known resources as the gold and diamonds of Brown and Morgan counties are not overlooked. The reader may even learn what kind of mineral waters he should use to improve his metabolism. Professor Logan's discussion of the Indiana kaolin is particularly full and interesting. Bacteria are generally understood to be responsible for a large share of human ills but it is only rather recently that they have been recognized as important factors in the formation of limestone and certain minerals. Professor Logan now proposes to make them responsible for the beautiful white clay called Indianaite. The origin of this variety of kaolin has long been a puzzle to geologists. Professor Logan's conclusion that it is the product of kaolin secreting bacteria promises to supplant the purely chemical theories of its origin.

The reader should be thankful for the general index and bear in mind that this portion is seldom complete or perfect in any book.

This volume should do much to stimulate interest in the geology of Indiana. It also fur-

nishes to other states and provinces a valuable and stimulating example in methods of presenting regional geology. General interest in geology can be fostered in no more effective way than by the publication of such handbooks as this. It furnishes in convenient form the sort of aid which the layman and young amateur need to enable them to understand their geological environment. A handbook of this type will go far toward helping the amateur discover that a geologist's hammer is capable of yielding more real sport than a golf stick. Geological hikes will become popular when it is generally understood that they afford unequalled opportunities for gathering health and strength as well as rock lore by the wayside.—E. M. K.

THE AUK, JULY 1922, No. 3.

Trapping Ducks for Banding Purposes, With An Account of the Results from One Water-Fowl Station.—By Frederick C. Lincoln, pp. 322-334, with 4 plates.

An account of methods of trapping ducks for the purposes of banding. Also an account of the trapping and banding of ducks at Lake Scugog, Ontario, by Mr. H. S. Osler of Toronto, in 1920, and some of the returns therefrom. Trapping operations were begun September 1st, coincident with the opening of the shooting season, and ceased on the freezing of the marshes, November 19. During the interval 225 ducks and some other species were banded. From these 35 returns were received. This of itself is interesting as indicating that at least 16% of the duck population can be expected to be killed by shooters before the following spring. A map showing the distribution of the returns is interesting. From Scugog, the birds seem mostly to have followed the Great Lakes to the west end of Lake Erie, cut across to the Ohio, down it to the Mississippi, and thence to the Gulf of Mexico. Others crossed over to the Atlantic coast, probably from Lake Erie, and were found distributed from Chesapeake Bay to southern South Carolina. The greatest surprise, however, was a Blue-winged Teal banded September 24th and taken December 9th at Port of Spain, Trinidad, B.W.I., 3,000 miles away. The value of the information obtained from a continuation of such banding is apparent to all. It will give exact data instead of guess work upon which to found game and conservation laws as well as our scientific hypotheses.

Bird banding is carried on under the auspices of the U.S. Biological Survey, working in Canada in cooperation with the National Parks Branch at Ottawa. Information on the work in Canada, permits, and instructions may be obtained from that source.

Bird Notes from North Greenland.—By Langdon Gibson, pp. 350-363.

This is a belated ornithological report on the birds observed in north Greenland during the first Peary Expedition of 1891-92. The specimens obtained have been reported on previously by Witmer Stone, *Pro. Acad. Nat. Sci. of Phila.*, 1895, pp. 502-505. Most of the notes were made near McCormick Bay, high up on the west coast of Greenland, near the mouth of Smith Sound. Notes are given on 29 species. The most important is that which pertains to the Greater Snow Goose, of which, it seems, a pair was found nesting. This is the first evidence we have of the breeding ground of these big white Geese. Their status has always bothered ornithologists. Though they have been recorded any number of times from the interior, it is probable that they have never occurred inland. At present we know them only from wintering birds off the Carolina Coast and from a flock of migrants which twice a year visit the lower St. Lawrence in the vicinity of Quebec. How they pass between these points and where they go to breed have been mere speculation, though they have been postulated to nest in the eastern Arctic islands. This record is our only clue to the mystery. The very existence of the bird as distinct from the Lesser Snow Goose has been seriously questioned and we assume that the specimens in the Philadelphia Academy of Sciences have been closely examined.

The Role of the Accidental.—By Joseph Grinnell, pp. 373-380.

Dr. Grinnell has always something interesting to say on philosophical subjects. In this paper he discusses the occurrence of occasional or accidental individuals. It is interesting to note that in the California list, out of 576 species accredited to the state, there are 32 cases of single occurrences. There are ten cases where species have been detected twice, in six cases three occurrences have been noted, and for all the rest four or more. Of course this is just what would be expected were all of them equally "accidental" for it would be rather paradoxical to say that the rarest were the most numerous. Dr. Grinnell rather objects to the use of the word "accidental" on the grounds that the occurrence does not happen by chance. This seems to be ungrounded objection to a word, for nothing ever does happen without due cause, but when the causes are too complicated and involved to be traced to their final effect; when we cannot predict the effect of many complicated and conflicting forces, as in the tossing of a coin,

we call the result "chance". These accidentals are surely chance in this view. Dr. Grinnell regards these occasional wanderers as the spyers out of territory, scouts of settlement as it were. If they find conditions congenial they may eventually form new colonies, otherwise they perish or return to their proper habitat, as the case may be. The pressure of any dense population is always centripetal and, through the accidental wanderer, advantage can be taken of any openings of relief in the wall of confining adverse conditions. It may well be that some of the discontinuous distributions that puzzle us nowadays were thus caused by wandering accidentals establishing themselves in oases of favorable circumstance.

Notes on the Food Habits of the Shoveller or Spoonbill Duck,—By W. L. McAtee, pp. 380-386.

Reports have already been made on the food of all the shoal water ducks of America but this one by the U.S. Biological Survey in its various Bulletins. The Shoveller was to have been included with the rest but Douglas C. Mabbott, who was to have prepared the account of its food habits, lost his life in France, hence it is completed here by the above. The Shoveller is largely a mud-feeder and does no damage to crops. Its food is largely insectivorous and it is not attracted by pure clean stands of valuable duck food plants so much as by sheer density of vegetation with its accompanying animal life.

Eider Duck—A correction.—By Geo. R. White. General Notes, pp. 411-412.

This is a correction of a record in *The Auk*, Vol. VII, of thirty-two years ago. A bird recorded as a Common Eider shot at Ottawa, Ont., proves to be a King Eider. This is a good example of the value of keeping a specimen and an exhibition of an excellent spirit of conscientiousness.

Birds Using Their Wings as A Means of Propulsion Under Water.—By J. E. H. Kelso, pp. 427-428.

Suggested by the Harlequin paper in a previous number. The writer says that from observations off the coast of Scotland he can say that Murres, Razor-billed Auk, Puffin, and the Manx Shearwater use their wings for propulsion under water. Loons, Grebes, Mergansers, and Ducks use their feet alone. He cites observations he has made on Lower Arrow Lake, B.C., on Buffle-heads, Golden-eyes, Coots, and others in their underwater activities.

Under *Recent Literature*, W. S. speaks sympathetically of Hewitt's *"The Conservation of the Wild Life of Canada."*

Under *Notes and News* the name of Mr. Ashley Hine, late of Edmonton, appears as a member of the taxidermic staff of the Field Museum of Chicago. With the magnificent new building on the lake front, the acres of wonderful exhibition halls to be filled and the Curatorship of Dr. Osgood in the Department of Zoology, Mr. Hines will have scope for his very great ability. We cannot but regret, however, that he had to leave his own country in order to receive recognition and the remuneration that should go with it.

THE AUK, OCTOBER, 1922, No. 4.

Notes on Some Labrador Birds.—By Harrison F. Lewis, pp. 507-516.

Though the author speaks of "Labrador", following the local vernacular and customary usage, he really means the north shore of the Gulf of St. Lawrence between Mingan, opposite the west end of Anticosti Island, and Blanc Sablon at the Straits of Belle Isle, just where official Labrador begins.

The notes consist of annotations on 36 species, mostly observed by him during a trip along the coast in the summer of 1921, but with a few additions taken from the collections of the Victoria Memorial Museum. The most important fact brought out is that the breeding sea birds are more numerous than recent literature would lead one to suppose. Much of this is probably due to the effect of the Migratory Bird Treaty, but also perhaps to the methods of transportation employed, the time spent, and the opportunities of observation that Mr. Lewis had. This is classic ground—the field of the famous *Labrador Journals* of Audubon, where he first discovered Lincoln's Sparrow and gained most of his knowledge of northern birds. It has been visited since by Stearns, Townsend and Bent and others, each adding his mite to the sum of our knowledge of the coast and showing the changes in bird life that were in progress. Mr. Lewis adds several species to the list of "Labrador" birds. The Alder Flycatcher was identified by its note—its most reliable character in life. This is the second record of this species. The Starling is recorded on the basis of a specimen collected at Betchewan in April, "four years ago" and now in the possession of Mr. F. W. Salzman. Mr. Lewis also identified a skin of a Bronzed Grackle in the same collection. The only other previous record of this species for north of the Gulf of St. Lawrence is an old one from Okak, of uncertain identity. Mr. Lewis shows plainly that this must refer to the Rusty Grackle, making this the first record for the Bronzed. He noted the Song Sparrow at Long Point, Natashquan, Eskimo Point, and

Harrington. The only previous record for the coast was at Blanc Sablon. The Cedar Waxwing is another addition to the coast list, the record being founded on specimens seen at Piashte Bay and living ones seen near Mingan. The Ovenbird was heard at Mingan. The only previous record for the species in Labrador was one by Stearns. He notes a Pied-billed Grebe taken at Bonne Esperance and now in the Victoria Memorial Museum which is the first one recorded from the coast. Outside of the new information contained and the records made this is a most admirable list. Though no specimens were taken, the circumstances of observation are given fully enough to carry conviction, whilst the evident familiarity of the author with the literature of the coast, its probabilities and improbabilities, show that he is aware of his responsibility and of the varying importance of each case. It is a valuable contribution to the literature of this region.

Field Studies of the Anatidae of the Atlantic Coast. —By Ludlow Griscom, pp. 517-580.

This paper is the result of an investigation to find out how far the accurate identification of the *Anatidae* could be carried by field observation. This number includes the Mergansers and the surface feeders. The Sea Ducks will be treated in another installment. General methods of identification are first presented, then the shape, flight and color patterns of ducks as seen by the observer. Under flight are the headings: Flight, Shape of Wings, The Arc described by the wings during a single beat, and Position of body in flight. Then follows a list of species, wherein the field marks of each one are minutely described. Dr. Griscom has evidently studied his ducks more carefully than have most ornithologists. Ducks can be recognized at surprising distances, often a mere flicker of the wings being sufficient for a few very skilled eyes. Whether others of less experience, however, can satisfactorily identify ducks in life by use of this description is another matter. However, a careful study of the details it points out and painstaking observation of the birds will assist all of us in more ready recognition of the ducks that we see.

Notes on the Abundance and Habits of the Bald Eagle in British Columbia.—By Allan Brooks, pp. 556-559.

Morality is said to be a matter of geography, and so is the economic status of many species. A bird may be a pest in one locality and an angel of mercy in others. The Bald Eagle in most of the great interior of the Continent is economically negligible and should be protected as a valuable and picturesque addition to the scenery. According to Major Brooks, on the west coast the tale is different. Here the Eagle occurs in remarkable numbers. A case is cited where over one hundred were counted in one day around the shores of Sumas Lake. Forty or more are often seen together and similar numbers prevail all along the vast indented British Columbia coast, where the total number must be very great. Nor are they here the meek seekers of offal that we know in the interior. Fish are their mainstay. Large salmon working over the bars into the river mouths are attacked and either killed or seriously injured. During most of the winter and up to June or July, however, ducks and waterfowl form the bulk of their food, and so relentless are they that the only safety for their prey is to take wing immediately on the appearance of the enemy in the distance. They never strike in the air, but once escape by flight is cut off and diving resorted to their victim's fate is sealed. In the clear water the Eagle can follow his prey with ease and be at hand when the inevitable moment of rising for breath comes. Sooner or later the victim is tired out and taken without resistance. Even the Common Loon and Canada Goose are so disposed of, but strangely a case is cited where a flock of white domestic ducks remained immune to attack whilst the Eagles slew about them daily.

Undoubtedly, while it is a crime to kill Eagles over most of the country, they, like all other good things, can become too numerous. Last year the Province of British Columbia was paying a bounty on Eagles. It is a question whether the result was satisfactory. Many Bald Eagles in the mountain valleys of the interior, where they are none too common and perfectly harmless paid the penalty. Whether the numbers of coast birds were appreciably reduced is problematical. The cost to the Province was certainly great and the reviewer knows of one case at least where the rare fact that a police officer happened to be an ornithologist was all that prevented an Eagle bounty being paid on a Red-tailed Hawk. In another case within our own observation Great Horned Owl bounties were paid on a nest full of Long-eared Owls. So works the bounty system.

Breeding of the Florida Gallinule in Ontario.—By Anne E. Perkins. General Notes, pp. 564-565.

Report of the species breeding in the summer of 1922 at Picton, Ontario. It may be well for the reviewer to record here having found this species during the summer of 1918, breeding from the Kingston Marshes up the Rideau Canal system to the mouth of the Kemptville Creek on the Rideau River, 30 miles from Ottawa.

Mourning Dove in Northern Michigan.—By M. J. McGee and K. Christofferson, pp. 566-567.

Notice of occurrence within some fifty miles of Sault Ste. Marie, Mich., They seem to be increasing their range in this direction and may cross our border into Northern Ontario at any time.

Nesting Notes from Ladysmith, Wisconsin.—By Wallace B. Grange, pp. 575-578.

Of 24 nests discovered during 1911, ten were from one cause or another destroyed or were unsuccessful in raising broods. In 1920, of three Ruffed Grouse nests, one containing 11 eggs brought out nine young. If this is the normal mortality of the nestling stage, not counting partial losses of broods, it supplies us with much food for thought. A careful and prolonged study of the percentage of failures of broods and, where possible, the causes, would be a very valuable addition to our knowledge of the factors that control the increase of species.

We would like to call the attention of subscribers who have had cause of complaint in the appearance or management of *The Naturalist*, authors whom we have had to ask to furnish plates for the illustration of their donated articles, and friends who have any complaint whatever against us to the following in *Notes and News.*:

"The A.O.U. is deeply indebted to Mr. Prentiss Baldwin who has generously financed the publications of the papers by himself, Mr. Talbot and Mr. Lincoln, on the various phases of bird-banding which have appeared in *The Auk* during the past few years. To Mr. Chas. L. Whittle we are similarly indebted in connection with the paper on the Arboretum Mockingbird."

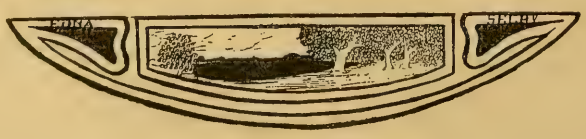
When such a strong and firmly established journal as *The Auk* is glad to receive extra assistance, we think something can be condoned in *The Naturalist*, which has worried along without such aid.

THE MINDS AND MANNERS OF WILD ANIMALS By W. T. Hornaday, Sc. D.A.M., *Scribner's*, New York.

The mentality of animals has been a fascinating subject since very early times, as is proved by countless fables and legends. To primitive man it was a very practical study, as his success depended very largely upon his ability to avoid being devoured by some and to capture others. Great as is the volume of material in the form of stories of domestic animals, anecdotes of pets, and hunters' tales, it is only of recent years that the animal mind has received any analytical attention, and the science of animal psychology is one of the youngest branches of zoology. The data with which this science has to deal are in part observational and in part experimental, and as a contribution to observational data Dr. Hornaday's book is of great value.

Dr. Hornaday is well known as a field naturalist, and his long experience in the field in many lands, and his position as director of the New York Zoological Park give him exceptional qualifications to write on this subject. A great deal which has been written concerning the behaviour of animals has been marred by extreme tendencies in two directions; that is, either by regarding all animals as mere machines, or at most as endowed with "instinct", or by an uncritical sentimentality. Dr. Hornaday's attitude is that of one who steers a sane middle course. He believes it is as sensible to choose "white rats, domestic rabbits, cats, dogs, sparrows, turtles and newts as the hand-picked exponents of the intelligence of animals" as it would be for an ethnologist to study "the Eskimo, the Dog-rib Indian, the Bushman, the Aino and the Papuan, and then to write conclusively on the intelligence of the human race", and yet on the other hand that "the temptation to place upon the simple acts of animals the most complex and far-fetched interpretations is a trap ever ready for the feet of the unwary".

To the naturalist this book will appeal strongly, not only because of the facts it contains, and the vivid portrayal of incidents, but because it will undoubtedly have a decided influence in securing a greater measure of fair play for wild animals.—A. B. K.



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The Canadian Field-Naturalist

VOL. XXXVII OTTAWA, ONT., APRIL, 1923. No. 4

THE SHORT-BILLED MARSH WREN (*Cistothorus stellaris*)

By EDWIN BEAUPRE

MY discovery of a pair of these Wrens breeding in Cataraqui Marsh during the summer of 1922 has caused me to think that they are gradually making their way eastward in Ontario. From the published records available, they appear to have been recorded several times in the western part of the Province, breeding, notably about London.

My first acquaintance with these interesting marsh inhabitants was formed May 24 when I observed a male hopping about and singing exuberantly in some thorn bushes growing along the margin of the marsh. As the female was not in sight at that time I thought the male was a migrating bird, but after keeping him under observation for a day or so and noting that he left the thorn bushes and took up his habitat among the reeds and sedges, I concluded that this jubilant singing was not intended for human ears, but that somewhere in the shadowy depths of the tangled marsh his little brown mate was listening.



NEST OF SHORT-BILLED MARSH WREN
Photo by Edwin Beaupré, Frontenac Co., Ont., June, 1922

At no time during any of my visits did the male make any attempt at concealment; on the contrary, from his chosen position in the tops of the swaying reeds, he seemed determined to broadcast the information to all and sundry that exclusive members of the Wren family were spending the summer in this particular part of Cataraqui Marsh.

The female, which I found to be the very embodiment of secretiveness, successfully evaded every attempt I made to flush her. Only once was I afforded a fleeting glimpse of her as she elusively slipped away from me through the weeds. I feel forced to remark that on that occasion her actions conveyed no definite hint as to the probable location of her treasures.

Under ordinary weather conditions the part of the marsh in which these Wrens decided to make their home would be entirely free from moisture, but the frequent rains in May of last year not only imparted an unusual growth to the sedges, but also caused the ground to become water-soaked and bog-like; and in my search for the nest I frequently waded ankle deep in water.

The globular nests of the common Long-billed Marsh Wren, fastened to the tops of the sedges in groups, are familiar and interesting sights in practically every marsh of any importance in

southern Ontario. But the nests of the species under consideration are not placed where they can be seen readily. These active little Wrens conceal their nests in the deep grass and sedges of the marsh, where they can be found only by a deliberate and careful invasion of their haunts.

On June 14, after hours of search, the first nest was located. From its unusually large size and completeness I concluded that the eggs would be laid and the brood hatched in this nest, which was empty at the time of discovery. The habit which these Wrens have of constructing nests which they do not intend to occupy was forcibly brought to my attention, when, upon revisiting the marsh on the 23rd, I found the nest still empty and deserted. This was very disappointing as it meant another long search in the grass and weeds, which had, in the meantime, become almost waist high, and every foot of the bog had to be carefully examined. From the standpoint of artistic construction the second nest, which contained seven white, unmarked eggs, was not to be compared with the one which had been abandoned. It was not half the size of the first one.

The globular nests were constructed of bleached and withered sedges with a lining of finer dried grass. Nest number one, in addition to the material mentioned, was firmly bound around the outside with fresh green marsh grass, making a much more compact and substantial structure than the one in which the eggs were deposited. No cattail material or mud was used in the construction of the nests. These nests were neither laced to the surrounding reeds nor anchored to the bog. The Wrens evidently depended upon the protection of the tall marsh grass and sedges for the safety and security of their lowly domicile.

Rev. C. J. Young, M.A., of Brighton, informs me that on June 16, 1920, at Shannonville, Ontario, he discovered one pair of these Wrens and found three nests, one of which contained fragments of egg shells. These nests were placed near the ground in a dry, grassy meadow. On the date of Mr. Young's last visit to these nests, July 12, there was no sign of the birds in the vicinity.

In *Birds of Eastern Canada* the author remarks that little appears to be known of the distribution of this species in Canada. This is not surprising when we consider how few people care to invade their marshy haunts in order to secure first hand information on this subject.

Some writers describe the song of the male Short-billed Marsh Wren as resembling the sound made by striking two stones together, or, as others say, rubbing a number of marbles about. After hearing the song repeated so frequently I came to the conclusion that the latter is the better imitation.

It seems that *C. stellaris* has the habit of suddenly appearing in a locality, just as it did here, and then as abruptly and completely disappearing and never returning to that particular place again. It is sincerely to be hoped that the kind reception they received here last year will encourage them to relax this hard and fast rule and that Kingston will be included in their 1923 itinerary. Needless to say, if my wishes in this matter should be favorably considered, and these Wrens decide to revisit us, they will be welcomed as a valued and interesting addition to the bird life of Cataraqui Marsh.

OCCURRENCE AND DISTRIBUTION OF MAMMALS IN YOHO PARK, BRITISH COLUMBIA

By PROF. TITUS ULKE

THE following brief notes contain a preliminary list of the mammals of Yoho Park, prepared incidentally to a study of its flora in 1922, and based largely on information kindly supplied by Chief Warden John M. Giddie, of Field, British Columbia. No doubt the number of different species may be increased from the 32 named to around 50 by further study, especially by trapping the smaller rodents, as two other chipmunks (forest and little mountain), the brown woodchuck, the Rocky Mountain jumping mouse, five other species of true mice, the brown pocket gopher, several kinds of weasels (Arizona, long-tailed and Bonaparte), the dusky and the masked shrew, and three or four species of bats may possibly, and quite probably do, occur within the present limits of Yoho Park.

1. Mountain goats (*Oreamnos montanus*) are numerous, especially in the Ice River region and the country lying back from the Canadian Pacific Railway track and approximately within the boundaries of Cataract Creek, McArthur and the Ottertail Rivers, but goats are to be found on practically all the mountains in Yoho Park. At the goat lick about a mile above the warden's cabin at Ottertail, and along the rim of the upper Hoodoo trail goats have extensively undermined

the banks in licking, and evidently frequently swallowing, the saline whitish clay thereof, as noted by the writer on August 18, 1922. A band of 23 goats were counted in the late afternoon of August 25, on the brush willow covered high western slope between Mount Wapta and Mount Field, evidently changing their feeding grounds. Goats are not at all troubled by coyotes, according to Mr. Giddie, an old experienced goat hunter, who also states that the record live weight of an old billy is close up to 600 pounds.

2. American moose (*Alces americanus*) are increasing and are to be found in the Beaverfoot Valley and Kicking Horse Flats, about Ottertail and along the Otterhead and Amiskwi Rivers. During the winter of 1921-22, at least ten wintered on the slopes bordering the Kicking Horse River and Ottertail, south of the Canadian Pacific Railway track and lying between Field and Ottertail. A cow moose, with a calf following it, on the evening of August 16 last, approached very near the Deer Lodge warden's cabin and was watched for several hours. About the same time a bull was killed on the tracks near Ottertail. During the past two seasons the Canadian Pacific Railway trains have killed at least five moose on the track between Field and the west boundary.

3. American elk, or wapiti, (*Cervus canadensis*), may occasionally come into the Park. They are found in the Vermillion River country, quite near.

4. Caribou (*Rangifer montanus*) were reported as occurring within the limits of Yoho Park in *Geological Survey Memoir No. 55*, Ottawa, 1914, but have not been seen recently, although probably still existing in the regions immediately west and north of the Park.

5. Mule deer (*Odocoileus hemionus*) are to be found in small numbers at different points; a few wintered on the west slopes of the Kicking Horse in 1921-22.

6. Western white-tail deer (*Odocoileus* sp.) are to be found in larger quantities than in previous years throughout the Park, but are not plentiful. The writer observed a number of does with fawns close to the Field-Lake Wapta road near the mouth of Sherbrooke Creek and also jumped one when approaching the Monarch Mine mill about the end of last August.

7. Richardson pine squirrels (*Sciurus hudsonicus richardsonii*) occur throughout the Park. The writer found them common in the woods about Field on the west slope of Mount Stephen.

8. Flying squirrels (*Glaucomys sabrinus latipes*), apparently, were rather numerous about the Ottertail and Deer Lodge rangers' cabins, where they often annoy the wardens by pulling out moss and other chinking material from between the logs of the buildings at night. A specimen was picked up by the writer on the trail, the skin of which measured 7 inches in width by 14 inches from nose to tip of tail.

9. Yellow-bellied chipmunks (*Eutamias quadrivittatus luteiventris?*) were not rarely observed near timberline on Mount Stephen and one in particular became quite friendly and fearlessly picked up crumbs of bread and bits of pecans the writer had scattered about, at lunch time, near his feet.

10. Mantled ground squirrels (*Callospermophilus* sp.) are generally distributed over the Park area, but do not appear to be common.

11. Columbian ground squirrels (*Citellus columbianus*) are quite abundant in many places in the Park. Numerous burrows of these rodents were noted in Yoho Valley.

12. Hoary marmots (*marmota* sp.) are common throughout the Park. They were frequently seen on the rocks above the high line trail leading from Twin Falls.

13. Bushy-tailed wood rats (pack rats) (*Neotoma cinerea*) occur throughout the Park, apparently.

14. Meadow mice (*Microtus* sp.) were found under logs in the Kicking Horse Flats.

15. House mice (*Mus musculus*) are numerous about barns and are frequently trapped.

16. Rocky Mountain muskrats (*Ondatra zibethica osoyoosensis*) probably still occur in the sloughs near Leanchoil, though not noticed lately.

17. Beavers (*Castor canadensis*) are to be found in the Ice River Valley particularly, but are working from the Kicking Horse River near Ottertail. The writer noted a number of lodges, dams and fresh cuttings about 5 miles north of the bridge over the Ice River, last August.

18. Yellow-haired porcupines (*Erethizon epixanthum*) are to be seen frequently throughout the Park and were observed by the writer as especially abundant in Yoho Valley.

19. Pikas, or rock rabbits (*Ochotona* sp.), occur at different points, both below and near timber line. They were frequently observed on the rock slides along the trail leading to the trilobite fossil beds on Mount Stephen.

20. Snowshoe rabbits (*Lepus* sp.) are plentiful and were frequently seen on the Field-Wapta and the Yoho roads in July and August.

21. Mountain Lions (cougar) (*Felix couguar*) are not plentiful in the Park. One specimen was trapped last winter. The writer observed fresh cougar tracks in the old road following the Beaverfoot River on August 17.

22. Canada lynxes (*Lynx canadensis*) are trapped every winter by the wardens. One

particularly large specimen was caught last winter near the Deer Lodge cabin, Hoodoo trail.

23. Coyotes (*Canis* sp.), both the big northern brown and the smaller lighter-colored kind, occur but are kept down as much as possible by the game wardens.

24. Otters (*Lutra canadensis*) were formerly trapped in the Park as indicated by the surviving names of rivers, roads, etc., such as Otterhead and Ottertail.

25. Minks (*Mustela vison*) are not common. One was seen by the writer near Trilobite Creek, above Field, on July 24.

26. Weasels (*Mustela* sp.) are to be found throughout the Park.

27. Martens (*Martes* sp.) occur along the Amiskwi River, in Yoho Valley, about Ottertail and elsewhere in the Park. They must have been quite abundant in former years, in the upper Yoho Valley, judging by the many trees, chiefly Douglas firs, seen boxed for traps.

28. Wolverines (*Gulo luscus*) are to be found within the Park boundaries but are evidently not common.

29. Black or cinnamon bears (*Ursus americanus*) have increased and are to be found throughout the Park. Two black bears were struck by Canadian Pacific Railway engines during 1922, and since the end of September one was killed outright.

30. Grizzly bears, or silver tips (*Ursus* sp.) are scarce. Mr. Giddie saw signs of them up Zinc Valley in the Ice River region and at Sherbrooke Lake, where the writer also noted grizzly sign late in August.

31. Water Shrews (*Neosorex* sp.) were trapped near Field on the Kicking Horse River.

32. Hollister's brown bat (*Myotis pernox* Hollister), a rare species not at all well known, was captured by the writer in a room of Mount Stephen House, at Field, on the night of July 20, and identified by Mr. A. H. Howell, of the U.S. Biological Survey.

NOTES ON THE OCCURRENCE OF THE PLUMED EGRET (Mesophoyx intermedia) IN BRITISH COLUMBIA

By F. KERMODE
Director, Provincial Museum, Victoria, B.C.

IN THE year 1915, Mr. J. H. Fleming, of Toronto, visited the museum and drew my attention to the Snowy Heron which we had labelled as *Egretta candidissima*, which had been secured by the late John Fannin at Burrard Inlet some years ago. Mr. Fleming kindly sent me, in January, 1916, a skin of *Mesophoyx intermedia*, to compare with the one in this Department, as he was puzzled with regard to the exact species of our specimen.

Up to this time our specimen of this bird had always been acknowledged and looked upon as the American form, *Egretta candidissima*, and, not having sufficient material for comparison, the matter had been left in abeyance for some time. However, in September, 1922, Mr. P. A. Taverner, the Dominion Government Ornithologist, visited the museum and wished to see the specimen of Snowy Heron which had for so many years been recognized as *Egretta candidissima*. He took descriptions, measurements, and made drawings of the same to compare with the specimens in the Victoria Memorial Museum, Ottawa. Mr. Fleming had loaned me a skin of *Mesophoyx intermedia* and when this was compared with our bird, they seemed identical. On October 17th, 1922, Mr. Taverner wrote me from Ottawa as follows:

> "Regarding the Egret. Whatever this bird is. it is not one of our American species. As far as I can see, it is identical with Fleming's specimen, but I am not well enough up on Asiatic species to identify it as such with confidence. It should be sent somewhere where they have an ample foreign collection, and probably the U.S. National Museum would be the best place. Have compared the drawings and measurements I made in Victoria and am only convinced that we have nothing like it in our collection. The only question remains is just what it is and whether the data attached can be absolutely depended upon. Do you think they can? I understand that Dr. Fannin was not at his best during his later years and that errors may have crept in."—P. A. TAVERNER.

Mr. Allan Brooks also has had correspondence with me in regard to this bird during the year 1922, and so as to have the identification of the specimen settled, I sent it on to the Biological Survey Department at Washington, D.C., asking Mr. W. C. Henderson, Acting Chief, to have Dr. H. C. Oberholser examine the specimen and compare it with specimens in the National Museum.

The reply which I received from Mr. Henderson Acting Chief of the Bureau of Biological Survey, is as follows:

> "The three specimens that you sent some time ago for examination by Dr. Oberholser

have been duly identified, and are being returned to you by express collect. The names you will find on the labels of the specimens. The heron turns out to be *Mesophoyx intermedia* in full breeding plumage. If the data on this bird are authentic and there is no reasonable doubt of its being the specimen originally taken on Burrard Inlet, it would prove to be an interesting addition to North American birds. We should be glad to have your opinion regarding this, as it is a matter of considerable interest in our work on the distribution of North American birds."—W. C. HENDERSON.

In regard to the dispute which seems to have arisen with reference to this bird being the specimen secured by the late John Fannin at Burrard Inlet, May 29th, I have looked up all records that I can find and have found a list in his own handwriting by John Fannin on *Birds collected Prior to 1886*. In this list he records the little White Heron, May 29th, 1879, Burrard Inlet. I have known this bird since September 25th, 1890, as it was in a case in the museum when I first entered the Provincial Government Service in this Department, and furthermore, I have since looked up photographs taken by Mr. Albert H. Maynard, of this city in the years 1890-91, and this specimen appears in the case. It has been suggested that probably the late Mr. Fannin had taken and duplicated the record of this bird with a skin purchased from a commission agent in this city years ago. This idea has been proved incorrect as this bird had been recorded in the late John Fannin's *Check-lists of B.C. Birds*, also in Montague Chamberlain's *List of the Birds of Canada*, 1887. I have also endeavoured to get into touch with people who knew Mr. Fannin at Burrard Inlet since 1862, when he first arrived in British Columbia. In speaking to me about this bird years ago, Mr. Fannin always informed me that it had been shot at Burrard Inlet by an Indian. Besides getting the information in the *Check-lists of the Birds Prior to 1886*, and the fact that Mr. A. H. Maynard told me he remembered this bird when he worked in the Department prior to my joining the Service, I did not obtain any more information concerning it for some time.

However, on January 24th, 1922, Captain Oliver G. Harbell, an old personal friend of the late John Fannin, happened to call at my office, and knowing that he knew Mr. Fannin for many years, I asked him when they first became acquainted. Captain Harbell said that he arrived in Victoria on October 13th, 1875, from St. John, N.B., and after being here a few days he went over to Burrard Inlet and was living at Moodyville (opposite where the City of Vancouver is to-day), and about this time he made the acquaintance of Mr. Fannin. After a few more questions I asked him about the collection of birds Mr. Fannin had and if he remembered what white birds were in the collection. He informed me that the only white bird he could remember was a White Heron that had been killed by an Indian on the shores of Burrard Inlet in the latter part of May, 1879. He secured this bird from the Indian, and knowing that Mr. Fannin was desirous of obtaining all the specimens possible he carried it over to Granville on the southern side of Burrard Inlet (now the City of Vancouver) to Mr. Fannin, who mounted it and added it to his private collection.

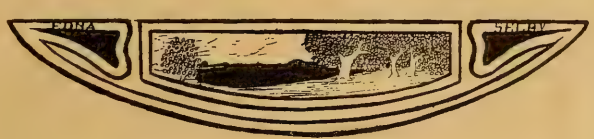
The following is a copy of a letter that Captain Oliver G. Harbell has written me over his own signature, and I think this should settle, once and for all, any doubts concerning the occurrence of the Plumed Egret, *Mesophoyx intermedia*, as an accidental visitant in British Columbia, and not only is it an addition to the List of British Columbia Birds, but also a record of an addition to the Birds of North America.

VICTORIA, B.C.,
January 24th, 1923.

F. KERMODE, Esq.,
Director, Provincial Museum,
Victoria, B.C.

I, Oliver G. Harbell, of Victoria City, do hereby declare I am the person who secured the specimen of White Heron, *Mesophoyx intermedia*, from an Indian at Burrard Inlet in the latter part of May, 1879. At the time I was living at Moodyville. The bird was freshly killed and I took it across the Inlet to Granville and gave it to John Fannin who skinned and mounted the specimen for his own private collection. This was prior to his becoming Curator of the Provincial Museum at Victoria, B.C.

The late Mr. John Fannin, after being appointed Curator of the Provincial Museum at Victoria for the Provincial Government, moved all his private collection to Victoria to form the nucleus of the museum. The specimen in the museum to-day is the same one that I gave the late John Fannin.—OLIVER G. HARBELL



BIRD NOTES MADE AT VASEAUX LAKE, SOUTH OKANAGAN, BRITISH COLUMBIA

April, May and June, 1922.

By MR. AND MRS. T. L. THACKER

THE following notes on the bird life observed in the neighbourhood of Vaseaux Lake may be prefaced by a short description of the general topography of the lake and of the surrounding country. We found that five more or less well-defined areas, with some birds peculiarly frequenting each, can be distinguished.

First we may take the lake itself. Vaseaux Lake is one of a chain of lakes through which the Okanagan River flows in a southerly direction. The best known of these is, of course, Okanagan Lake, south of which lie Skaha, Vaseaux, and Osoyoos Lakes in the order named. Vaseaux Lake is at an elevation of about one thousand feet above sea-level; and is about three miles long, and probably nowhere as much as a mile wide. In some places it is of considerable depth, though a great part of the northern end appears to be fairly shallow; and its waters are reputed to be well stocked with fish, including the large-mouthed black bass, a fish which is seldom met with else where in British Columbia, and the carp, a species which is extending its range northwards and has in recent years reached the top of Okanagan Lake

Where not described later, the shore-line is composed of large rocks and boulders; but across the southern end of the lake there is a fine beach of sand, gravel and mud, which affords good feeding ground for waders. A similar shorter beach, facing south is found connecting a rocky knoll with the shore, far up on the eastern side of the lake. Between the knoll and the shore is a muddy swamp, and another short beach connects with the knoll at its northern end.

At the upper end of the lake is a large area of what we may separate as our second district. This covers all the reed and tule beds, marshy hay-meadows and swamps—including the swamp just referred to—which prove so attractive to ducks. At the northern end the swamps are intersected by the main channel of the river, and also by wide "lagoons", and these afford opportunities of approaching the birds in a shallow-draught boat. Scattered patches of reeds occur at other points around the lake; but it is only at the northern end that these are at all extensive.

Immediately at the water's edge, on a great part of the eastern shore of the lake, is a narrow fringe of bushes and trees, comprising willows, black birches and alders, with occasional hawthorns and other species. In some places at the north and south ends this growth extends back for a considerable distance on the drier bottom-land; and at the water's edge it is often augmented by a thickly-matted tangle of dead sticks and decaying masses of vegetable debris, carried there by the waves of the lake when at its highest level. These provide good shelter for many small birds; and some species are seldom met wtih elsewhere than in the thickets of these fringes and bottom-lands, which form our third district.

Beyond them, and around the whole lake, lies what we are including under the general heading of "range", but this itself might well be subdivided into two or more easily distinguished parts, the first and most typical of the whole district being those dry slopes and sandy plains upon which the antelope brush (*Kunzia tridentata*) popularly called "greasewood", appears to be the only shrub able to maintain an existence. Its curiously-grown bushes at first bring to mind the graceful tamarisk of Southern Europe; but the resemblance is superficial only, for instead of being willowy and soft, the old stems in particular are extremely harsh, refusing to give way as you push past them. They grow to a height of ten feet, and are easily recognised, their gnarled and twisted, even tortured, appearance giving them a character entirely their own.

Passing from the area of the "greasewood", one moves, either directly or through stages where little grows but sagebrush and its allies, towards the other part of the range, which in its extreme form is simply bull pine forest. Between these extremes lies the range proper, rolling land, some of which is practically flat bench-land, covered with bunchgrass, sagebrush and other plants able to endure the arid conditions, but most of which lies at varying slopes, often the results of moraine formation; and here may be seen the brilliant yellow flowers of the Balsamorhiza, and the beautiful Calochortus lily. Numerous deep hollows, known by some geologists as kettle-holes, some of which contain small lakes, are found in parts of the moraine, and these attract water-birds, not strictly inhabitants of this type of country; mention of these will be made under our first heading.

Both east and west, ridge after ridge of rock rises more or less abruptly from the grassy bench-lands. These ridges are generally precipitous on

one side, but more gently sloping on the other, timbered more or less according to the amount of water to be obtained, mainly with bull pine, but sometimes with Douglas fir. Wherever the soil is not too thin to support it, bunchgrass grows; this is for a short time bright green in spring, but soon becomes dried and brown as the days get hotter. Little rain or snow falls in the valley (generally less than a foot of snow is on the ground at any time during the winter.)

Our fifth division is the rocky bluffs and screes. Only at one point on the eastern side of the lake do actual bluffs and rocky slopes reach the water; elsewhere they stand out boldly in the range land; and it is only as nesting sites for certain species of hawks and one or two others, and as the habitat of some species peculiar to the rocks that we have separated these from the range itself.

1. THE LAKE.

When we first arrived at camp the birds most in evidence were the Geese (*Branta canadensis* ssp.), small flocks of which were continually flying up and down the lake. During the earlier part of our visit their loud, strident voices were heard incessantly, often waking us up in the middle of the night as the birds flew overhead. One day we saw twenty-six of them in a field at the south end of the lake. Near by is a nest of the Fish Hawk (*Pandion haliaëtus*) at the top of a tall pine; and we were told that one year a Goose took possession of it and raised her brood there. This year also the Geese visited it, but in the end the Fish Hawks themselves used it.

Six nests of Geese were reported at the lake.

Towards the end of our stay the Geese were much less noisy; and the most persistent voices round our camp were those of Holboell's Grebes (*Colymbus holboelli*). The Pied-billed Grebe (*Podilymbus podiceps*) we also heard constantly in the reed beds near camp, making its extraordinary noises, which seem so loud for the size of the bird. One bird came near enough for us to see the yellow-white eye and the black-banded bill, and a purplish gloss on the head and neck. The odd shape of its bill gives the bird the appearance of having a "Roman nose", and this is most noticeable when it lifts its head up in making the characteristic call.

The only other Grebe we saw—the Horned Grebe (*Colymbus auritus*)—was shyer; at long range, the ear-tufts looked like one broad fan of shining golden brown, with the apex towards the forehead, above the black feathers of the head.

Close to camp there was a narrow reach of the river, bordered on one hand by wild hillside and on the other by reed-beds; here we often saw Ducks of various commoner species, the Hooded Merganser (*Lophodytes cucullatus*), with splendid black and white head, slender black bill, a wonderful coppery sheen on the sides, and delicate black and white stripes on the wing, being specially worthy of mention.

Coots (*Fulica americana*) were very plentiful during our early days at the lake, often causing a great rushing noise as they swept along the surface of the water, beating their wings rapidly. The sound, one imagined, was like that of an approaching tornado; quite startling, in fact, until we became familiar with it. Not very many birds, however, of these large flocks remained to breed.

On May 9, we were delighted for some minutes by the appearance of a solitary Black Tern (*Hydrochelidon nigra surinamensis*) in his sombre colouring, seen close at hand as he was flying gracefully over the small bay by our camp.

At the edge of the lake, and beside the small slough near by, where frogs were plentiful, four species of waders were recorded, and we often saw the prints of a large bird, doubtless the Bittern (*Botaurus lentiginosus*), in the mud here.

Not far from camp was a deep kettle-hole with a permanent pond of some size. A Ruddy Duck (*Erismatura jamaicensis*) in the highest breeding plumage remained here for one day; and a couple of small waders, probably Solitary Sandpipers (*Helodromas solitarius* ssp.) also stayed here for a day on migration. A pair of Barrow's Golden-eye (*Glaucionetta islandica*) were much in evidence on the kettle-hole slough for two or three weeks; but, as far as we could tell, they went elsewhere to breed. These deep holes, so common in moraine country, seem to be the favourite haunts of this species.

2. THE REED-BEDS AND SWAMPS.

Towards the end of April we saw a couple of Sandhill Cranes (*Grus mexicana*) on the swampy meadows at the north end of the lake; and heard their rolling call at intervals until we left in the second week of June. A little later flocks of Little Brown Cranes (*Grus canadensis*) were noticed on migration.

On arrival at the lake on April 18, we were told that the Bittern was already back. Some days later we heard its single hollow note, not at all loud, but its full *oomp-galoomp* was not heard till considerably later.

At our end of the lake we knew of only one Tule Wren (*Telmatodytes palustris* ssp.). This species, like most of its congeners, has a cheery song, and its characteristic actions make it a very fascinating bird to watch.

The Carolina Rail (*Porzana carolina*) we came across in a small slough, some hundreds of feet

above the lake, where we were lucky enough to get a good look at it.

We must not forget to mention the Red-winged Blackbird (*Agelaius phoeniceus*), which gave us many opportunities of admiring the almost tropical beauty of its plumage; fortunately for those who delight in seeing birds of a brilliant hue, of which there are so few in our northern climes, this bird is plentifully distributed over a great part of our country, and is by no means shy.

The Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*) we did not find breeding close at hand, but it was recorded on three occasions. The Red-winged Blackbirds were much disturbed by the presence of these visitors, who did not get a friendly reception and soon left.

At the southern end of the lake the low-lying meadows are irrigated, and two species were met with there which we did not observe elsewhere in the neighbourhood of the lake. These were Brewer's Blackbird (*Euphagus cyanocephalus*) and the Bobolink (*Dolichonyx oryzivorus*). The Cowbird (*Molothrus ater*) is also common in these meadows, but travels farther afield, for we saw it on other occasions close to our camp.

3. THE THICKETS.

Perhaps the thickets around our camp were at their best at the end of April; for then company after company of migrants came in, stayed a night or so, and vanished. These included several species of Sparrows, Warblers and Flycatchers. Representatives of most of these stayed in the neighbourhood and presumably bred; but some of them remained only one night, passing on to breed at a greater elevation.

At dusk on May 8, we came on a flock of Sparrows just settling to roost in a Saskatoon bush which was in full flower. A sort of concert seemed to be in progress, for one White-crowned Sparrow (*Zonotrichia leucophrys* ssp.) was singing its complete song, and other birds, which we presume were of the same species, kept up a twittering chorus. On being disturbed, the whole flock flew to another bush and resumed their melodious vespers.

Late one afternoon, when searching for the Long-tailed Chat (*Icteria virens longicauda*), whose striking notes we had heard on the previous evening from the other side of the river, we found ourselves in a swampy thicket at the north end of the lake. Here our objective was for a time forgotten owing to the large number of different species present. There was a veritable chorus of songs, and birds were moving about in every direction. Seven different songs were to be heard almost continuously in the immediate neighbourhood.

As we pushed on through the thicket to hunt the Chat, which still eluded us, a bird broke into a song somewhat resembling that of the Robin, (*Planesticus migratorius*), but quicker and more musical. This was a Black-headed Grosbeak (*Zamelodia melanocephala*).

Although we failed to see the Long-tailed Chat on that occasion, a few days later we had several fine views of these handsome birds in the same locality. The song of this species is so loud and clear that it at once arrests the attention of the hearer; and although, on the first occasion on which we heard it we had never seen the bird, we anticipated its identity; and later on we were able to ascertain it. This is in all probability the most northern spot that the bird reaches in this province, although it is possible that its range extends some twenty miles further.

Many other species frequent the thickets and denser woods, thirty species at least being easily recognised. Our notes on the Humming-birds record the Rufous Humming-bird (*Selasphorus rufus*) as plentiful, while the Calliope (*Stellula calliope*) was sometimes seen, although more generally met with at higher altitudes. The Black-chinned Humming-bird (*Archilochus alexandri*) we saw several times in clumps of birch trees where they were busily endeavouring to monopolise certain Sapsucker holes.

Large black bees (or hornets?) were visiting these trees, and there was considerable exudation down the stems, attracting many flies. At one tree a pair of these Humming-birds paid special attention to two particular holes and made successful sallies against five or six Calliope Humming-birds which persisted in trying to reach these holes. The male, when not helping himself, perched on a branch a few feet away from his favourite hole, and drove off any Calliope that appeared; while the female, at the second hole, took full advantage of this, and was feeding most of the time we were watching, although occasionally she would help in keeping off the smaller birds. All the Humming-birds seemed to respect the large insects that were coming and going, and retreated quickly out of reach if one of these flew in their direction. During the time we watched, the Calliopes seldom reached the holes, and certainly were not allowed to stay long. We passed the place again one evening at dusk, and the Humming-birds were still busy at the tree.

We found three of these clumps of birches, a mile or more apart, the same business being in progress at each of them; and the swift movements and graceful actions gave us all great entertainment.

4. THE RANGE.

The hour of the day is an important factor in the success which attends bird-study in any locality; but here on the range it is more marked than in the thickets we have just referred to. We could generally count on seeing about twenty species during a walk of two or three miles across the range at the right time of day.

Magpies (*Pica pica hudsonica*) were very common; their nests were most conspicuous and many of them were quite low down, but few of these low ones were occupied. Hawks of several kinds were often met with, and also three species of Woodpeckers.

In suitable places we could hear the fine song of the Solitaire, (*Myadestes townsendi*) which bird frequents the moister parts of the wooded hillsides.

As night fell, the voices to be heard on the range were few compared with those of the lake and the reed-beds; but the cries of the Nighthawk (*Chordeiles virginianus* ssp.) and the Great Horned Owl (*Bubo virginianus* ssp.) as well as the shriller cries of other Owls, might be recognised.

5. THE BLUFFS AND SCREES.

While the larger birds of prey, as well as Owls and Swallows of several species, are well represented among the bluffs and screes near Vaseaux Lake, we pass on to the two species which most held our interest during our visit—we refer to the White-throated Swift (*Aeronautes melanoleucus*) and the Canyon Wren (*Catherpes mexicanus conspersus*). We first saw two or three of the Swifts from the top of the cliff near camp on May 7; and the next day counted sixteen of them at an extensive cliff east of Okanagan Falls. Again, in the canyon of a creek which joins the Okanagan River a little below Vaseaux Lake, we saw a few more, some of them flying within a few feet of us. Several times we tried to locate their nesting site, and saw the birds disappear into the face of the cliff, but we had not much hope of ever being able to reach the place; and it is doubtful whether, had we attempted to take the eggs, it would have been possible to get them out of the small cracks into which the birds had entered.

Two pairs of Canyon Wrens lived in the scree below the big cliff at camp; and many a time we could hear their powerful song fully two hundred yards away. In most places we found these birds very difficult to observe. Among the great extent of tumbled rocks they were hard to pick up; and so restless were they, continually dodging here and there, under, over, and around the bigger masses of rock, that they had ample protection in the many-coloured shadows. Once they got out of the field of one's glass, it was often impossible to find them again. They would enter holes in the cliff, and remain in them for a considerable time; eventually emerging with a burst of song, only immediately to disappear into some hidden crevice. At other times they were kinder to their audience, and in plain view would perch on some prominent corner and sing away merrily, only moving a short distance before breaking forth again. One could not, however, rely with any certainty upon the entertainment, for on several occasions we visited the talus to study them, and no song was heard, nor perhaps indeed were we fortunate enough to get even a glimpse of the little musician.

Their song, besides being of wonderful volume for the size of the bird, appears to us to be composed of more strictly musical intervals than that of almost any bird we have heard; and it is also peculiar in the fact that, while sung in a descending scale, the notes are longer as the song proceeds, increasing to the very end in both strength and richness of tone.

It would not be fair to use so much space in describing the Canyon Wren, were we not to give due tribute to its less brightly-coloured relative, the Rock Wren (*Salpinctes obsoletus* ssp.) Though it is much commoner in most of the dry country, we failed at first to see very much of this species. It does not keep quite so closely to the rocks as does the Canyon Wren, but will on occasion fly well out among the tree-tops and there give forth its noticeable song. With its slender bill wide open, and body "bobbing" up and down as it sings, it has a very graceful appearance, the very picture of melody—we have seen Nightingales in the same attitude.

Although we did not find them, we have suspicions that the Poor-will (*Phalænoptilus nuttalli*) may have laid her eggs near this spot. In the gloaming one evening one of these birds alighted silently within six feet of us in the dead ashes of our camp-fire, and there was almost indistinguishable from a piece of half-burnt wood. In the morning the footprints were plainly visible in the ashes.

We have now come to the end of our notes; but before we close we would like to express our sympathy with the action of the authorities, who we learn, are making Vaseaux Lake and its borders a permanent bird sanctuary, and to record our indebtedness to Mr. G. Gartrell, of Summerland, for advising us to spend our holiday there. We have also to thank Major Allan Brooks and Messrs P. A. Taverner and J. A. Munro for their kindness in helping us in many ways while we were at the Lake.

WINTER BIRD LIFE AT OKANAGAN LANDING, BRITISH COLUMBIA, 1917 and 1918

By J. A. MUNRO

WEATHER conditions during the winter of 1917-18 were more temperate than is usual and the snowfall was heavier. On November 30th occurred the first hard frost and December, except for one cold day on the 8th, was mild with occasional snow storms. Following these came light chinook winds, which melted much of the surface snow, which steadily accumulated nevertheless and by the end of the month measured eighteen inches on the level. January 8th ushered in zero weather with a stiff north gale. The temperature rose again on the 10th and for the balance of the month averaged 35° Fahrenheit at noon. During this period approximately two feet of snow fell, much of which was melted by subsequent chinooks. February continued mild until the 13th, when the thermometer registered zero again. This cold snap lasted until the 20th of the month, the lowest temperature recorded being 8 degrees below zero. During the following week brilliant sunshine was the rule, with hard frosts at night, and February went out accompanied by a strong chinook which melted much of the heavily crusted snow. Excepting two days of zero weather with icy north winds on March 4th and 5th the spring month was one of alternating cloudy and sunny days, thawing during the day and freezing at night until the 23rd. By the 15th of the month all snow had disappeared for two hundred feet above the lake and the hills with a southern exposure were bare to the summits.

Food suitable to the needs of all winter residents was unusually plentiful, but many species that generally winter commonly were scarce or absent. The tangled patches of pigweed and lamb's quarters in many of the neglected orchards were without the usual crowd of Redpolls and Juncos and the rose-hips and snowberries hung from the bushes until they rotted with the revival of spring. A particularly heavy yield of yellow pine and Douglas fir seeds would perhaps account for a big increase in the number of Pine Siskins, an invasion of Crossbills and the return of Clarke's Nutcracker in considerable numbers, after an absence of several years. No Short-eared Owls, Marsh Hawks, Tree Sparrows or Red-winged Blackbirds were noted and both species of winter Grosbeaks were scarce. Surface-feeding Ducks, with the exception of a small flock of Mallard and a few Baldpate, left ahead of the first freeze on November 30th, the last Pintail and Green-winged Teal being seen on November 25th. No Ring-neck Ducks or Lesser Scaups were seen and other diving Ducks with the exception of Redhead and Scaup were less common than usual.

The following species were observed within a radius of ten miles of Okanagan Landing between November 15th and March 31st, inclusive.

Colymbus holboelli. HOLBOELL'S GREBE.—Last seen at Swan Lake on November 25th, when they were abundant. These birds left shortly before the freeze-up at the end of the month and none wintered on Okanagan Lake as in previous years.

Colymbus auritus. HORNED GREBE.—Four individuals wintered in the vicinity of Okanagan Landing and were seen daily. On a clear day in January, while I was lying over a fleet of Redhead decoys, an exceptional opportunity was obtained for observing one of the feeding habits of this species. The blind wherein I lay concealed was built on the end of a narrow, flimsy jetty, such as are used on Okanagan Lake for private boat landings. The floor of this particular jetty was about five feet above the surface of the water, which was crystal clear and slightly less than five feet in depth directly below the blind. One looking through the cracks in the floor of the jetty —which also formed the floor of the blind—or alongside over the top of the blind, could see every boulder, every pebble on the bottom of the lake within the field of vision, so clear and still was the water. Towards my decoys came a single Grebe, diving and reappearing again, working gradually closer until it had passed through the fleet and was directly beneath me. Then it became evident that this bird was hunting the crayfish that lurked under many of the stones and its method of hunting was this: A slanting dive was taken towards one of the stones on the bottom and, directly this was reached, the bill was thrust underneath and quickly withdrawn. Then by vigorous movements of the feet the stone was completely encircled and every crevice along its lower edge probed by the darting bill. During this operation the body appeared rigid and slanting upward, while there was the greatest harmony between the rapid flexions of the neck, the vigorous thrusts of the bill and the rapid movement of the feet. The wings were held tightly to the sides. If the stone was a small one it would be encircled during one immersion and sometimes two stones were worked before rising to the surface but several large stones were visited a second time after an interval on the surface. From my vantage point on the jetty all these movements

were as plainly seen as if viewed through the glass walls of an aquarium, indeed this experience was suggestive of certain useful studies of fish in captivity. I could see the glistening air globules adhering to the sleek back, the puffs of sand dislodged by the probing bill, and when the bird shot to the surface I instinctively flinched as though my face were in danger.

Although my bird hunted assiduoulsy for fully fifteen minutes no crayfish were captured during that time and this was a disappointment as I was anxious to learn if these crustaceans were swallowed while below the surface. Later, however, I saw several captured in quite shallow water close to the beach. These were small crayfish and were swallowed whole with no apparent difficulty. Here the water was six inches deep or less and the method of exploring the stones was by submerging the head and neck while swimming on the surface.

Gavia immer. LOON.—One individual was seen at intervals during January and February; the first migrants arrived on March 16th.

Larus argentatus. HERRING GULL.—A small flock accompanied the steamer on its daily trip between Penticton and Okanagan Landing. Seventeen was the largest number noted in one day and the majority of these were adults. No California Gulls were in this wintering band.

Mergus americanus. MERGANSER.—Less common than usual. Not more than ten were seen during the winter.

Mergus serrator. RED-BREASTED MERGANSER.—One female frequently observed during January and February in Okanagan Lake, always feeding a hundred yards or more from shore. The feeding habits of this species and the last as observed on Okanagan Lake are dissimilar in many respects. In fishing, *americanus* swims rapidly with head submerged the greater part of the time, and follows the contour of the shore. Usually three or four birds work together and when fish are sighted they rush along the surface, with wings vigorously beating the water—undoubtedly the object being to drive the quarry into the shallows where capture is easy. The smaller species, on the other hand, follows a comparatively straight course, generally in deeper water, diving at intervals with the quick clean dive of a Grebe and without the preliminary rounding up of the quarry. The female mentioned above was collected on March 14th and an examination of the gullet and stomach revealed one bull-head and one crayfish.

Anas boschas. MALLARD.—A flock of eight wintered in a small stream known as Long Lake Creek which empties into Okanagan Lake north of Okanagan Landing. As portions of this creek remained open all winter these birds were not driven to forage along the lake shore in quest of pond-weeds that are washed ashore—a common practice here of Mallards during severe winter weather.

Mareca americana. BALDPATE.—Observed during January in attendance on the Redheads on Okanagan Lake. On January 10th five were seen dipping in shallow water a few feet from shore. When disturbed these birds flew directly into the flock of Redheads feeding a hundred yards farther out and when danger was passed swam rapidly back to shallow water. This movement was repeated every time a waggon or pedestrian appeared on the shore road.

Marila americana. REDHEAD.—Present in their usual abundance on Okanagan Lake but not plentiful near Okanagan Landing until much later than usual owing to the relatively open water which prevailed at their feeding grounds on other portions of the lake. The wintering flock numbered about fifty in November, one hundred in December and increased during January until the maximum for the month was reached on the 17th when it was estimated that eight hundred birds were present. The flock decreased in February to fifty or sixty and began to expand once more in early March. Two hundred birds were counted on March 2nd and during the two weeks following small bands arrived daily until on March 15th two thousand birds were present, divided into three flocks. During January and February small flocks fed close to shore, but later on, when the flocks increased in size, the birds became more wary and kept well out in the lake during the day time, visiting the shallows near shore only in the morning and evening.

Marila valisneria. CANVAS-BACK.—Four individuals seen during January and February and fifteen, the majority drakes, noted on March 16th.

Marila marila. SCAUP DUCK.—Present in their normal number; more common during January than during February and reaching the maximum (four hundred estimated) on March 13th. Drakes were always greatly in the majority.

Glaucionetta clangula americana. GOLDEN-EYE.—As this species when feeding travels more than do most other diving Ducks it was difficult to estimate the number of wintering birds. Two young males remained all winter in the little creek referred to before and several others were seen daily at different points on the lake shore. Eight was the largest number counted in one day.

Charitonetta albeola. BUFFLE-HEAD.—Buffleheads were quite common during November but the majority left with the first freeze. A number of these wintered at the south end of the lake but

only five individuals remained near Okanagan Landing.

Fulica americana. COOT.—No large flocks were present until the end of February. On March 2nd a flock estimated at five hundred was seen feeding near a raft of Redheads and these remained in the vicinity for several weeks.

Gallinago delicata. WILSON'S SNIPE.—Common until early December. One bird wintered along the margin of Long Lake Creek.

Oxyechus vociferus. KILLDEER.—The last fall migrants noted on November 25th and the first spring arrival on March 2nd—none wintered.

Dendragopus obscurus richardsoni. RICHARDSON'S GROUSE.—In spite of a close season during 1917 this species and also Ruffed Grouse and Sharp-tails were scarcer than during the previous winter. Here there was no "invasion" of Goshawks and Horned Owls—factors that are said to account for a similar scarcity in other districts. Indeed, since the rabbits disappeared in 1915, Horned Owls have become decidedly uncommon. It was noted during the preceding spring that broods of all species of Grouse were unusually small although there had been a fairly dry hatching season. It is believed that this may be accounted for by loss of vitality in the parents due to the presence of a parasitic organism in the intestines. A dead Richardson's Grouse found on April 20th, 1918, had the intestinal tract infested with cestodes and had undoubtedly succumbed to their action.

Accipiter velox. SHARP-SHINNED HAWK.—A female collected on January 11th was the only specimen seen during the winter. This was a bird of the previous year, the plumage showed no abrasion and a few scattered slate-blue feathers in the back were the only indication of moult.

Astur atricapillus. GOSHAWK.—Five adults seen. A male taken on February 13th had been making daily forays into the poultry yards of the community.

Archibuteo lagopus sancti-johannis. ROUGH-LEGGED HAWK.—Two pale-colored birds frequented the open, hilly range surrounding Goose Lake during the latter part of November.

Aquila chrysaëtos. GOLDEN EAGLE.—A male and a female, adults, visited the wooded range east of Okanagan Landing on January 9th but did not remain in the vicinity.

Haliæëtus leucocephalus alascanus. NORTHERN BALD EAGLE.—An immature bird was seen flying over Okanagan Lake several times during January and February.

Falco columbarius columbarius. PIGEON HAWK.—An adult female taken on December 25th was the only Merlin seen.

Cryptoglaux acadica acadica. SAW-WHET OWL.—Early every evening after February 15th this species was heard in an aspen bluff at the base of the mountain behind my house. The note was clear and bell-like, repeated monotonously with no change of inflection.

Otus asio macfarlanei. MACFARLANE'S SCREECH OWL.—One specimen was brought to the local taxidermist. None were heard or seen in the field.

Bubo virginianus saturatus. DUSKY HORNED OWL.—An example of this race was brought to the local taxidermist. This bird was said to have killed and partly eaten a full grown tame goose. None were observed in the field and this scarcity is thought particularly worthy of note in view of the unusual abundance of the species reported from various points on the Pacific Coast.

Nyctea nyctea. SNOWY OWL.—One was seen on February 18th and reports were received of the presence of several others. This species has been only slightly more common in the past two years, while on the Pacific Coast their unusual abundance has caused considerable comment.

Dryobates villosus monticola. ROCKY MOUNTAIN HAIRY WOODPECKER.—The usual number of this subspecies were observed.

Dryobates pubescens homorus. BATCHELDER'S WOODPECKER.—More common than usual and during the cold weather several individuals visited my orchard where they fed on frozen apples.

Picoides arcticus. ARCTIC THREE-TOED WOODPECKER.—A female collected on March 23rd had beeen working on a large yellow pine (*Pinus ponderosa*).—This tree was four feet in diameter at the base and much of the surface bark to a height of forty feet from the ground had been scaled off by the industrious bird. In some places the light porous bark was chipped out to a depth of three inches over a circumference of six feet or more and the ground, within a radius of six feet from the trunk, was piled high with fragments. This is the first record I have for either species of *Picoides* in the Okanagan Valley below the region of Murray pine and larch.

Phlœotomus pileatus abieticola. NORTHERN PILEATED WOODPECKER.—Two individuals were seen on a semi-open pine flat whenever this locality was visited. The decrease of this species during recent years is most marked and can only be ascribed to human agency.

Colaptes cafer collaris. RED-SHAFTED FLICKER.—At least ten birds wintered, feeding chiefly on frozen apples while this food was available. Nearly every morning in the latter part of February a male Flicker, possessed by a precocious mating instinct, practiced his roll-call on the boarded eaves of my bungalow. An excellent sounding-

board it proved and possible more comforting to his head-muscles than the tin eave-trough, but his enthusiasm for this exercise was not shared by the occupants of the house, particularly when a devil's tattoo commenced at the first signs of dawn and banished slumber from the household.

Pica pica hudsonia. MAGPIE.—There appears to be no change in the status of this species in spite of individual attempts at control.

Corvus brachyrhynchos hesperis. WESTERN CROW.—Not common at any time during the winter and absent from January 4th to February 9th, inclusive. During the latter part of February and the first two weeks of March approximately one hundred birds roosted in a small wood-lot within the city limits of Vernon. From this roost they departed in the early morning hours to forage in the brushy coverts and ploughed land along the creek bottom between Vernon and Okanagan Landing.

Nucifraga columbiana. CLARKE'S NUTCRACKER. —The first Clarke's Crows seen for several years arrived during the early fall and remained all winter. Twenty was the largest number counted during a day's travel. During the nesting season in early March they were quite silent; even the harsh noise made by the wings in flight seemed to be subdued at this time.

Sturnella neglecta. WESTERN MEADOWLARK.— A few probably wintered but none were seen by the writer between November 27th and March 2nd.

Euphagus cyanocephalus. BREWER'S BLACKBIRD.—A band of twenty wintered in the vicinity of Long Lake Creek.

Hesperiphona vespertina. EVENING GROSBEAK. —A small flock wintered in the city of Vernon, attracted by the abundant seed crop on the Manitoba Maples.

Pinicola enucleator montana. ROCKY MOUNTAIN PINE GROSBEAK.—One heard on January 9th, two seen on January 20th and one heard on March 5th.

Loxia curvirostra minor. CROSSBILL.—Unusually abundant after January 8th.

Leucosticte tephrocotis tephrocotis. GREY-CROWNED ROSY FINCH.—On January 17th, six were noted picking up pigweed seed from the snow in a small enclosed garden. Afterwards they alighted on the fence and were seen at close enough range to be identified positively as *tephrocotis.*

Astragalinus tristis pallidus. PALE GOLDFINCH. —Absent from November 27th to March 1st, inclusive. All individuals comprising a flock of twenty seen on March 2nd had their under parts blackened from feeding amongst burnt timber. This flock had doubled in size by March 13th and several males collected on this date showed the first indications of the spring moult.

Spinus pinus. PINE SISKIN.—A flock estimated at thirty was seen at intervals during the early part of the winter, the forerunners of an invasion that commenced in the latter part of February. From February 26th onward they were abundant both in the deciduous woods of the creek bottom and in the yellow pine and Douglas fir stands. In the latter area they fed entirely on coniferous seeds. Sometimes fifty or more might be seen in one tree, clinging to the cones upside down in Crossbill fashion, and such flocks were possessed by a spirit of unrest. Their presence in the crown of a lofty fir could be detected by a faint rustle of seed-wings dropping groundward—for the birds were often silent in their occupation—and their discovery frequently just preceded a hurried departure. Rising in a cloud they would disappear in the forest, perhaps to return a few minutes later to the very tree from whence they had so suddenly departed. Several specimens collected on March 14th had the sexual organs enlarged and it was observed that many had paired. On March 18th a pair were seen carrying nesting material and the foundation of their nest was discovered twenty feet above the ground on an outer branch of a tall yellow pine. The material used in the nest was fine twigs and both birds were at work on its construction. The male uttered a soft *whe-e-e-e* at short intervals, otherwise they were industriously silent.

Plectrophenax nivalis nivalis. SNOW BUNTING. —A flock of fifty (estimated) seen at Goose Lake on November 25th.

Junco hyemalis connectens. SHUFELDT'S JUNCO. —Unusually scarce, eight being the largest number seen in one day during January and February. No migrants arrived until March 19th.

Melospiza melodia. SONG SPARROW.—Fewer wintered than is generally the case and these remained chiefly in some dense weed patches in the creek bottom.

Bombycilla garrula. BOHEMIAN WAXWING.— First seen on December 28th. On the following day a great flock descended on my orchard and in a short time had made vast inroads on the frozen apples still attached to the trees. After this date they were noted in small flocks at irregular intervals until March 14th.

Myadestes townsendi. TOWNSEND'S SOLITAIRE. —This species was noted regularly in the coniferous timber which also harboured the usual bands of Mountain Chickadee, Red-breasted and

Slender-billed Nuthatch, a lesser number of Pygmy Nuthatch, and an occasional solitary Brown Creeper.

Planesticus migratorius propinquus. WESTERN ROBIN.—None wintered; the first migrant arrived on March 2nd.

Sialia mexicana occidentalis. WESTERN BLUEBIRD.—A flock of twelve remained all winter close to Okanagan Landing and reports of others were received from different points in the Valley.

IN MEMORIAM

James Stirton Wallace

Born, 1868 Died, 1922

In the passing of Jim Wallace on July 24th, nature students and horticulturists in Ontario lost one who was not only an enthusiastic member but, in many cases, one of their dearest friends of their group. For twenty years he had been intimately associated with students of both these phases of Nature, beginning with birds, in which he became interested in 1906, and very shortly afterwards adding to his enjoyments the culture of flowers in an intelligent and studious way.

Early in his ornithological career he began to visit Point Pelee with Fleming, Swales, Taverner and the writer, and at once he became the most energetic of the group. At the Point, where he persuaded the others to put up a small house familiarly known as "The Shack", he was the instigator of many a visit that would not otherwise have been made, and his enthusiasm inspired everyone to keep eternally on the job. When an early morning start was to be made, and such starts were the rule rather than the exception, any suggestion of going out without breakfast and returning for it later would meet with the kindly and jocular refusal, "Not for your Uncle Dudley," but he was always game to get up early enough to put across any scheme that was in mind. He it was who took upon himself the duties of housekeeper, and would leave the others, not one whit more interested than himself, to continue the field work while he went home to prepare dinner. None of the participants will ever forget the morning when the mosquitoes aroused us from our camp at one a.m., to hover over a fire and smudge until about three, and then to tramp to the end of the Point, about two miles away, where we witnessed the finest flight of Swallows any of us have ever seen, nor the little friendship fires we built so many times by the last trees to enable us to stand the cold winds and observe the Ducks, Grebes and other migrants pausing on their journey in the shelter of the Point.

To the writer's mind comes particularly the Sunday morning when we crouched in the shelter of the junipers at the "last trees" in exactly the same place where we had been the day before, but in the interval there had been deposited at our feet fresh feathers of a Saw-whet Owl, one of those elusive migrants, the very fact of whose travels was unproved till Point Pelee gave up the secret. The great day of the discovery of their migration, when 30 or 40 of these birds were found by the two hunters, it was the fortune of Wallace and the writer to be absent on the marsh, and no efforts of ours on the following day could unearth a single one of the voyageurs. He was the one who took the only Summer Tanager we ever found there, and he found the single pair of Tufted Tits on which the whole record for Canada rests, one of which was taken.

For twenty-odd years he had summered for as many weeks as possible at Fancy Free Island in the Rideau Lake, which he came to look on as home, and where he took on all the duties of the head of the house, though he had no financial interest whatever. One of his Toronto friends, going down with Jim for a "holiday", put the question on the first day, "Well, Jim, what are we going to do to-day?" The answer was prompt, "We're going to shingle the barn." And they did. It was at Fancy Free that his horticultural bent first asserted itself, and there he had free rein to do as he wished. At first, he was abundantly satisfied with surplus stock from the gardens of his friends, but he soon outgrew that phase, wanted to learn all about his particular favorites and bought freely of the best there were. Beginning with Dahlias, which grew to perfection in the moist air of the island, he rapidly added Irises, Peonies, Gladioli and Larkspurs. On all these his opinion was sought and esteemed by his friends. On the first-named he was considered the best authority in Ontario, though his modesty scouted any such idea, if it were even hinted at. He was persuaded to write a brochure on varieties and the cultivation of the Dahlia, which was published by the Toronto Horticultural Society, and contains

in very brief form some of the knowledge gained by his work.

Golf and curling were his two athletic enthusiasms, and in each of these he made, as usual, a number of fast friends, but in the later years both these pursuits were more or less neglected in favor of the garden and his business. He held a responsible position on the staff of management in the St. Croix Soap Co., and it is not too much to say that among his real hobbies was "Surprise Soap". Small wonder, then, that some of his most sincere mourners were those with whom he associated daily in the fulfilment of business duties.

Jim (he was always "Jim" to his friends) possessed in an extraordinary degree the faculty of making warm friendships, and the wonder is that he found the time to cultivate so many of them. And they were all so warm, too. Since his death the writer has frequently heard the statement that the fact of a common friendship with him now forms bonds of unusual sympathy, and one lady writes that she was amazed that utter strangers to her were apparently anxious to go far out of their way to be of service to her—a mutual friend.

Losing him was a tough experience, but in the sympathetic memories of his friends, his name and qualities will live.

His death was occasioned by the effort to prune a poplar tree at Fancy Free, one of the large-toothed species, *Populus grandidentata*, and apparently he trusted too much weight to a dead limb, and, standing on the top of the ladder, with nothing but the branch to steady him, he fell when it broke, and turned over in the fall so as to shatter the fifth vertebra. He was conscious for two days, and spoke touchingly of his many friends, sending them messages, and directing the disposal of his effects. His best and largest garden, that at Lambton Club, is being kept intact as a memorial. In addition his friends at the Club have erected a bird bath and fountain in commemoration. He was born at Port Elgin in 1868, and at his own wish he was buried there beside his mother, who died some years previously.—W.E.S.

NOTES AND OBSERVATIONS

BROWN CREEPER THE VICTIM OF STRANGE ACCIDENT.—At Point Pelee National Park, Essex County, Ontario, on November 14, 1922, I found the body of a Brown Creeper that had met death in such a strange and unusual form that the accident seems worthy of note. To reconstruct the accident, the bird had been flying through a clump of juniper, in which the lower twigs were mostly dead and bare to a height of five or six feet from the ground. The bird was passing through the network of fine twigs at 4—5 feet from the ground when the primaries near the end of one of its wings caught in a few of the tiny twigs, the bird, carried by its momentum, spun around the main twig about three times and hung by the primaries. There it died. My examination showed that I actually had to unwind the primaries from the twig to which they were attached, by lifting the body around and around the twig, before the body became free. In connection with the untimely end of this little bird it is interesting to note that Dr. A. K. Fisher has recorded Hummingbirds, a Goldfinch, and a Myrtle Warbler caught by the Burdock (cf. *Am. Nat.* X, No. 4, 1876, pp. 239-40).—HOYES LLOYD.

FURTHER NOTES ON THE EUROPEAN HARE IN ONTARIO.—In the fall of 1921 Mr. J. H. Fleming of Toronto, sent in for *The Canadian Field-Naturalist* a note describing a rabbit skin taken near Brantford, Ontario, and sent to Oliver Spanner & Co. of Toronto in the autumn of 1915 to be tanned and comparing it with six or eight skins of the European hare which he had examined later. Mr. Fleming detailed the history of the introduction of the European hare into Ontario in the vicinity of Brantford in 1912. The manuscript regrettably went astray during the transfer of the place of publication of the *Naturalist*, and in the meantime Professor J. R. Dymond has published substantially the same information in the November, 1922, issue of the *Naturalist*.

Mr. Fleming has recently sent me a news item published in *The Globe*, Toronto, January 20, 1923, headed: "New Giant Rabbits Harvest Fall Wheat. Premature Gathering of Crop Is Resented by Farmers of Norfolk."

> "Simcoe, Jan. 19.—Farmers from different parts of the county in attendance at the annual meeting of the Agricultural Society yesterday reported that rabbits, especially the new giant variety, have become alarmingly numerous and are working havoc, rooting through the snow and getting at the fall wheat, cropping it off close in a wholesale fashion.
>
> "Rabbit hunting, therefore, will become, not a pastime, but a necessity of farm work. One farmer, who apparently has technical knowledge of the new species of hare, holds that it does not multiply as rapidly as the ordinary rabbit, but breeds two litters, of, at most, three young each, in a year.

> "In any event, the farmers are alive to the situation and occasionally one runs across a rural nimrod who has on display a line of 15 or 20 big, plump rabbits in natural cold-storage until required."

Early in 1920 the skin of a hare shot near Aylmer, Elgin county, Ontario, December 22, 1919, was received for examination at the Victoria Memorial Museum from Mr. H. C. White of the biological department of Queen's University. Mr. White stated in a letter that "These hares are becoming very abundant in a large section of southwestern Ontario. It lives strictly in the open fields, feeding upon winter wheat and rye and attains a weight up to 14 pounds. The specimen which I am sending weighed 10½ pounds. They made their first appearance in Elgin county about six years ago."

The above specimen was a flat "hunter's skin" and the absence of the skull and of proper material for comparing the skin prevented a definite determination of the species.

Mr. Gerrit S. Miller in his *Catalogue of the Mammals of Western Europe*, 1912, discusses eight European races of *Lepus europæus*, and says (p. 502): "The difficulty of clearly understanding the various local forms of European hares is greatly increased by the frequency with which the animals are transported from one region to another for the purpose of restocking exhausted hunting grounds. *L. e. transylvanicus* has thus been taken to Denmark, and *L. e. occidentalis* to Switzerland. Other instances of the same kind will undoubtedly be found."

The spread of this animal and its apparent adaptation to the climate of southern Ontario is of great interest and should be closely watched by local naturalists and the Provincial authorities, for, although the fur has some value and the animal is of value as food, there may be in addition to the menace to crops other consequences attending the spread of the species. The phenomenal increase of the rabbits introduced into Australia and New Zealand should be a warning against the careless and uncontrolled introduction of exotic animals. Furthermore a study should be made of the rabbit diseases, as the hares of continental Europe are said to be affected often with toxidiosis, a disease with symptoms resembling tuberculosis. Whether this is a matter directly affecting the hare population alone, as seems to be the case with the periodic epidemics which afflict some of the native species of hares, should be determined before the spread of the species becomes too extensive.—R. M. ANDERSON.

THE STARLING AT LONDON, ONTARIO.—It becomes my sad duty to chronicle the arrival of the European Starling at London Ontario.

On Saturday, February 17th, 1923, we were going for a walk north east of the city, a direction in which we hardly ever go, and in passing a hollow where the city garbage department had been filling in with ashes, our attention was called to some half dozen Crows and literally hundreds of English Sparrows that were picking up a living on the scraps of garbage which were mixed in with the ashes. As we went over to see what else there might be a Meadowlark flew up, and as we drew still closer we scared away another bird that looked very much like a Starling. It flew south, however, and as we were heading north we did not go back to make sure of its identity. We went out the next afternoon, though, and found seventeen of them sitting on some brush under the lee of the bank on the north side of the dump where they were sheltered from the wind. A man living nearby advised us that they had been there since December. Several specimens are now in London collections.

Other occurrences of the Starling in Western Ontario are:

1921 Two or three at Port Stanley on May 15th as already recorded in the *Naturalist*.

1922 Again reported from Port Stanley at various times during the summer. Sept. 29th.—Three at Wheatley observed by W. E. Saunders. Oct. 22nd.—Seven near Aylmer.

1923 The flock of seventeen at London above referred to.—E. M. S. DALE.

THE HABITS OF *Cucumaria frondosa*.—In the vicinity of St. Andrews, New Brunswick, on the coast the Bay of Fundy, *Cucumaria frondosa* is a very common species, and I have had a good opportunity to study this holothurian during several seasons at the Atlantic Coast Biological Station.

This species occurs just below low-tide mark on rocky bottom in locations where the bottom consists of ledges or of boulders. In some places they are extremely abundant, and on Tongue Shoal, in Passamaquoddy Bay, where the water is about three metres deep at low tide, I have seen hundreds of individuals so close together that their expanded brownish tentacles resembled a large mat of sea-weed. During the spring and the early part of the summer, when the temperature of the surface water is from 10° to 12°C., this species occurs in the lower tide-pools, but later in the season, when the surface temperature ranges from 15° to 16°C., they migrate to the ledges below low-tide mark.

It is usually stated that holothurians feed on the organic material contained in the mud which

they swallow. This is certainly not the case with *Cucumaria frondosa*. For one thing there is little or no mud in the habitats in which they live, and no individuals of this species occur on the mud-flats or in any other very muddy situations. If an individual is watched for any length of time it will be seen that the tentacles are expanded and withdrawn at irregular intervals, or else that one tentacle after another is withdrawn into the mouth and then expanded again. The significance of these actions I discovered only after very close observation. The surface of the branches of the tentacles is of a glutinous nature, and planctonic animals, especially Copepods, adhere to the tentacles when they strike them. When the tentacles are withdrawn into the mouth the prey is removed. Thus this species is not a mud-feeder but a plancton-feeder.

Respiration in *Cucumaria frondosa* is somewhat irregular, but many specimens under observation ejected the water from the anal aperture once every two minutes with fair regularity.

The change of form which this species undergoes is remarkable, as it assumes practically every shape from almost spherical to very slender and elongated, or it may be constricted in the middle and take the form of an hour-glass.—A. BROOKER KLUGH.

NOTE ON A RED SQUIRREL.—Late last fall, at my summer place near Black Rapids on the Rideau, I came across a fine specimen of red squirrel with a white-tipped tail. Later on we saw him frequently and had every chance to inspect him, as he was quite friendly.—MARK G. MCELHINNEY.

SNOW BUNTING AND LAPLAND LONGSPUR IN TREES.—In an early number of *Bird-Lore* there appeared a photograph of Snow Buntings perched in a tree. The writer has also observed this apparently unusual phenomenon at least once in southern latitudes.

On March 11 of this year some seven Lapland Longspurs were observed in a field about five miles east of London, and, after flying about for several minutes in an erratic manner, one individual alighted about twenty feet up in an elm.

This habit does not seem to be a pronounced one for this group in settled regions, though the writer has several times observed Snow Buntings hanging to spruces in latitude 56°N. at the same season.—E. W. CALVERT.

SNOW BUNTINGS AND PIPITS PERCHED IN TREES.—On April 15, 1920, about 6.30 a.m., I saw two Snow Buntings (*Plectrophenax nivalis nivalis*) perched in tree tops near Quebec, P.Q. Two fir trees, about thirty feet high, one dead, the other one partly dead, stood about a rod apart on a fence-line between two fields. One Snow Bunting was in the top of each tree, and I examined them there at my leisure. The morning was fine and moderately cool, with a light westerly breeze.

On May 9, 1920, I observed seven Pipits (*Anthus rubescens*) near Quebec, P.Q., and recorded in my notes, "Pipits perched freely in a tree. I heard them sing, both when on the ground and when in the tree."—HARRISON F. LEWIS.

MAGPIES AND STOCK.—That the late reports of Magpies injuring stock do not indicate a newly developed habit of the species is evident from the following extract from *The Winning of the West*, Theodore Roosevelt, New Library Edition, Putnam & Sons, Vol. III, part 2, p. 187, where in the description of the hardships experienced by Zebulon Pike in the winter of 1806-07 in the vicinity of the great peak that was later named after him the following appears:

"The horses suffered most; the extreme toil and scanty pasturage weakened them so that some died from exhaustion; others fell over precipices; and the magpies proved evil foes, picking the sore backs of the wincing saddle-galled beasts."—P. A. TAVERNER.

NOTE ON PUGNACITY OF TREE SWALLOWS.—In the spring of 1919 two Tree Swallows persistently fought for possession of a bird-house. While I was digging in my garden one Saturday afternoon the two birds came tumbling to earth, almost striking the spade. So tenaciously were they locked together that both were picked up in the hand. This experience evidently did not make them more cautious, as they continued to fight for several days afterward. In one instance they came into violent contact with the scantling of a board fence.—C. E. JOHNSON.

Occasionally a subscriber complains that *The Naturalist* does not contain enough material relating to the branch of natural science in which he is particularly interested. To such a one we would say that the pages of *The Naturalist* are open to papers, notes, reviews and photographs relating to any department of natural history and that all suitable material in all branches received to date has been published or is about to be published. If any part of the field of natural history does not receive sufficient attention in *The Naturalist* it is simply because the workers in that part of the field have not been sufficiently active in submitting material for publication. The remedy for such a situation must come from those workers themselves.—EDITOR.

BOOK REVIEW

MARINE AND FRESH WATER INVERTEBRATES COLLECTED BY THE CANADIAN ARCTIC EXPEDITION, 1913-18.

Since my note about this subject was published in the *Ottawa Naturalist* for May, 1918, p. 30, twenty-seven different reports belonging to four volumes (VI-IX) have been published by the Dominion Government, and additional ones are in preparation. The first report was issued in August, 1919, the latest in February, 1923.

The sea-squirts (Ascidians) appear in Vol. VI, and the report discusses, besides the C.A.E. specimens, also other Arctic material, except the Hudson Bay and Strait area, which is treated in *Contrib. to Canad. Biology*, New Ser., Vol. 1, 1922. As is the case with so many of the other marine invertebrates, the Ascidian fauna in the area examined by the Canadian Arctic Expedition was almost entirely unknown; while now a dozen species are recorded. Perhaps the most interesting of these is *Cystingia griffithsii*, originally described by MacLeay from Winter Island, Fox Channel, (lat. 66°N., Long 85°W.), Arctic Canada (Parry's 2d. Expedition), but not secured later; so that its systematic position remained uncertain until now ample material from north of Bering Strait and from Dolphin and Union Strait was brought back by the Canadian Arctic Expedition; and the species is found to be merely an unusual specimen of the well known *Caesira* (*Molgula*) *crystallina*, first described by Moeller in 1842, from Greenland.

Vol. VII in the Canadian Arctic Expedition series is devoted exclusively to Crustaceans; and some of the groups (Decapods, Isopods and Parasitic Copepods) have already been referred to in the *Ottawa Naturalist*, May, 1918. The report on the Isopods takes in all the Arctic species known, as is the case with the one on Parasitic Copepods; the latter report also lists the Antarctic species and their hosts.

The Schizopod Crustacea comprise five marine species (one of which is new to science) and one from fresh water; the latter one is the interesting glacial relict *Mysis relicta*, hitherto known only from northern Europe, Hamilton Inlet and the Great Lakes area, but now also recorded from Bernard Harbour (Dolphin and Union Straits), Arctic Canada (see *Canadian Field-Naturalist* for May, 1921, p. 99.)

The Cumacea include four species and one variety, all belonging to the same genus (*Diastylis*.).

The Amphipods (scuds) comprise fifty marine and three fresh water species; one of the latter (*Synurella Johanseni*, see *Canadian Field-Naturalist* for October, 1920, p. 128) is new to science. Of the marine species, one, *Katius obesus*, is now recorded for the first time from the Pacific, and the known ranges of several of the others have now also been greatly extended. An appendix consisting of the specimens collected by earlier Canadian Arctic Expeditions (*Neptune*, etc.) has been added to this, as to others of the reports in these volumes.

The peculiar Pycnogonids (Pantopoda) which are really a kind of marine spiders, are included in this volume, following the usual custom of treating them together with Crustacea. The specimens from the Canadian Arctic Expedition belong to three species; while three others already known from the Canadian and Alaskan Arctic are recorded.

We now come to the smaller Crustaceans, the Entomostraca. Of these the Euphyllopoda comprise three species of fairy-shrimps, one tadpole-shrimp, and one clam-shrimp; the whole of the American Arctic being considered (see *Canadian Field-Naturalist* for February, March, May, 1921.)

The Water fleas (*Cladocera*) include several fresh water and two marine species. One of the former is an interesting pleagic deep water form from a lake at Bernard Harbour. No marine Cladocera were secured east of Point Barrow, Alaska.

The Fresh-water Copepods comprise ten species, four of which are new to Science. One of them is an interesting stenothermal, cold water form, hitherto not found in America.

The marine Copepods include 3 dozen species, six of which are new. The most interesting record is that of *Limnocalanus grimaldii* from Collinson Point, Arctic Alaska; hitherto it was known only from the Baltic, Caspian Sea and the mouth of the Jena River in eastern Siberia.

Most of the above reports are illustrated by line-drawings showing the new and more interesting species.

The last report in this volume (VII) contains a description of the various lagoons, lakes and ponds examined during the expedition, with particular reference to their Crustacean life, and is illustrated by maps and photographs.

In Vol. VIII will be found the reports upon Mollusks, Echinoderms, Coelenterates, etc. Of these the reports on the Echinoderms, and recent and pleistocene, terrestrial and marine, bottom Molluscs have been referred to in the *Ottawa Naturalist* for May, 1918. Of these two reports, the former also takes in specimens from the eastern part of the American Arctic, collected by other Canadian expeditions (see also *Contrib. to Canad.*

Biol. for 1922); and the latter has 3 fine, heliotyped plates.

The report on Rotatoria (wheel-animalcules) records 64 species (four of which are new); specimens from the northern part of the Alaska-Yukon boundary being included. The most interesting form is a new marine *Synchaeta* from Amundsen Gulf, Arctic Canada, where it was found in vast numbers in the surface; all the other species are from fresh water. Four plates accompany this report.

The voluminous report upon the Alcyonaria and Actinaria (corals and sea-anemones) by the veteran Zoologist, Prof. A. E. Verrill, takes in the whole of the American Arctic, and also hitherto unpublished material from Alaska, British Columbia and the Atlantic Coast of Canada and New England. Thirty species (four of which are new) of Alcyonaria, and twenty-eight species (five of which are new) of Actinaria are described in detail, illustrated by many text-figures and plates; some of the latter ones are heliotyped. The pelagic Actinaria-larvæ from Camden Bay, Arctic Alaska, secured under the sea ice in October, 1913, are particularly valuable.

The report on the Medusae and Ctenophora (jelly-fishes) is accompanied by two beautiful, heliotyped plates; and takes in also the Medusae collected by the *Neptune* in the eastern part of the American Arctic. Sixteen species are recorded and described, one of which is new, and another (hitherto known only from Bering Island, Arctic Asia) belongs to the family Lucernaridae, which is attached to sea-weed, and thus not floating in the water as are other Medusae. An interesting chapter about the distribution and hydrographic importance of Arctic Medusae is added to this report.

The report upon the Hydroids (Polyps) enumerates 25 marine species from both the western and eastern part of the American Arctic; and also mentions a fresh water form (*Hydra*) from Camden Bay and Bernard Harbour.

The report on the Bryozoa (Polyzoa) records more than fifty species; like the Hydroids, from the whole of the American Arctic, and attached to sea-weed, stones and shells.

In Vol. IX of the series will be found the reports upon the different worms (both free-living and parasitic), and also the most primitive animals known, the Protozoa.

The report on the Oligochæta has already been mentioned in the *Ottawa Naturalist* for May, 1918. The report upon the related marine forms (Polychæta) describes 4 dozen species, nine of which are new. Some pelagic larval stages are also referred to; and specimens from the eastern part of the American Arctic secured by Canadian expeditions included.

In the report upon the leeches (Hirudinea) three species, attached to fishes, etc., are described.

The report upon the peculiar worms, Gephyrea, describes a new species from Hudson Bay collected by the late James Macoun, and records five other species from the coasts of Canada and Alaska. A complete bibliography for this group of animals, which is added to the report, is not the least valuable part of it.

The report on the Acanthocephala describes a new species from the King Eider and three others from fresh water and marine fishes, while the report upon the Trematodes and Cestodes describes two flukes from halibut and seal and a score of tape-worms, four of which are new species, from fishes, birds and mammals. Next to nothing was hitherto known about parasitic worms in the American Arctic regions.

Finally the report upon the minute, but important Foraminifera, which are responsible for the formation of the sea-bottom, limestone-layers, etc., records 26 species from ice-cakes and dredgings in the western part of the American Arctic. A similar report upon the Foraminifera in the eastern part of the American Arctic will be found in *Contrib. to Canad. Biol.* for 1921.

Most of these reports are illustrated by detail-figures.

Any of the above mentioned reports may be had on application to the Department of Marine and Fisheries, Ottawa. The Dominion Commissioner of Fisheries, Prof. E. E. Prince, is Chairman of the Scientific Committee in charge of the publication of this series, to which contribute a great many specialists from Canada, United States and Great Britain.—F. J.

EUPHYLLOPODS FROM THE ARCTIC.—Mr. Frits Johansen, the marine biologist of the Southern Party of the Canadian Arctic Expedition, has by his careful collecting provided a large amount of very interesting marine and fresh-water material from the comparatively unknown Arctic coast of Canada. He is first and foremost a naturalist, whose greatest delight is in observing the varied forms of life as they occur in nature.

This is well shown in his recently published account of the Euphyllopoda (principally fairy shrimps) of that Expedition (*Canad. Arctic Exped. 1913-18*, Vol. VII, part G.). Although the number of species is necessarily small (four), he has given us very considerable details concerning their occurrence, habits, rate of growth, etc., in the region of his observations. This is the first comprehensive account of Canadian Arctic Euphyll-

opods, and together with his article on this group that was published in Volume XXXV of *The Canadian Field-Naturalist*, forms a good basis for future work. It is to be hoped that whenever naturalists in different parts of this country happen to discover any of these interesting forms in the temporary pools of the spring season they will preserve specimens and forward them to the Victoria Memorial Museum for examination and report. The fairy, oppossum and clam shrimps that comprise this group of animals are of unusual interest owing to their sporadic occurrence, their great abundance (when they do occur) in comparatively small bodies of water, and their unusual habits.—H.

PROF. VERRILL ON CANADIAN CORALS AND SEA-ANEMONES.—An outstanding geneticist and biometrician (Raymond Pearl) stated recently in *Science* that if a man "describes accurately, carefully, and completely a hitherto undescribed species of animal or plant, in such a way that any one who reads carefully the description can recognize and identify the thing described, he has chiseled for himself an indelible record in the history of man's intellectual progress." Honour can never be withheld from those who have thus laboured to increase and bring order into our knowledge of the varied life of our world. No one has made a higher place for himself in connection with the life of American waters than has Professor A. E. Verrill, of New Haven, Connecticut. He was the first to recognize and describe a host of marine animals belonging to many groups and occurring along the Atlantic coast of our continent. He has been the greatest of the pioneers in this field, and he is still busily engaged in this same work. We in Canada are in his debt for the work he has done in collecting and reporting upon material from our coast near Anticosti and in the Bay of Fundy in the sixties and seventies of the last century. He also identified a large amount of material for Dr. Whiteaves, in the latter's investigation of the fauna of the Gulf of St .Lawrence. Now again he has come to our assistance in working up the sea-anemones and corals of the Canadian Arctic Expedition, and of other collections made off our coasts. (*Rept. Canad. Arctic Exped.* Vol. VIII, Pt. G., 1922.)

After more than 50 years of labour in the systematic field, Prof. Verrill has not become stereotyped, but continues as active as ever in efforts to improve the classification of the groups with which he is working. In this recent publication of his he finds occasion for creating new species, genera, and families. The article, or rather series of articles, consists of 164 pages and 31 plates, and is replete with illustrations, the majority of which are from his own hand. An extremely large amount of material belonging to the Anthozoa or "flower-animals" has passed through his hands, so that he has been able to write with a very full experience of the animals of this group as they occur along both coasts of North America. It is very evident from a perusal of this work of Professor Verrill's that many problems in the taxonomy, distribution, habits, etc., of these interesting forms remain to be solved. His account of them should be an incentive to some of our younger workers to take up their study.—H.

A BIOLOGICAL SURVEY OF LAKE GEORGE, N.Y. By J. G. Needham, Chancey Juday, Emmeline Moore, C. K. Sibley and J. W. Titcomb, N.Y. Conservation Commission, Albany, N.Y., 1922, 78 pages. Illustrated.

This ecological reconnaissance of an Adirondack lake is of interest to Canadian biologists because the biota of this lake is identical with that of many lakes in eastern Canada, and it should be carefully studied by all those in charge of fish-cultural operations.

The survey was in charge of Dr. Needham, and in his section of the report he deals with the hydrography, vegetation and the fish best adapted to the lake, and presents a series of concise recommendations as to the fish-cultural policy which should be adopted. Dr. Juday reports on the temperature, transparency, and dissolved gases of the water, and on the plancton and bottom fauna. Dr. Moore deals with the primary sources of food of the fishes, giving the food-relations of the most important species, and discusses limiting factors. Mr. Sibley gives an annotated list of the fishes and deals with the food of the adult fish, and Mr. Titcomb presents observation on fish culture.—A. B. K.

ROOSEVELT WILD LIFE BULLETIN, Vol. 1, No. 2, N.Y. State College of Forestry, Syracuse University, Syracuse, N.Y.

The current number of this quarterly bulletin which is edited by Dr. C. C. Adams, Director of the Roosevelt Wild Life Experiment Station, is largely devoted to investigations on the Beaver. The extensive report on the Beaver in the Adirondacks by Dr. C. E. Johnson is a very valuable contribution to economic zoology, and the author's conclusion that "The present investigation has shown that the Beaver of the Adirondacks may be made a valuable source of revenue to the State if properly managed" has a direct application to many regions in Canada. Part 2 of this same report is an excellent summary of our present knowledge of the natural history of the Beaver. The paper on *The Life of the Yellowstone Beaver* by E. R. Warren presents an interesting picture of the behaviour of the Beaver under complete protection, the writer stating that these usually shy animals are "obliging enough to go about their usual activities almost oblivious to the interested observers lined up on the bank beside the road." Both papers are illustrated by many very good photographs.—A. B. K.

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The Canadian Field-Naturalist

VOL. XXXVII OTTAWA, ONT., MAY, 1923 No. 5

A PRELIMINARY REPORT ON THE RELATION OF VARIOUS DUCKS AND GULLS TO THE PROPAGATION OF SOCK-EYE SALMON AT HENDERSON LAKE, VANCOUVER ISLAND, BRITISH COLUMBIA

By J. A. MUNRO

DURING the spring of 1921, application was made to the Commissioner of Canadian National Parks by the Fisheries Branch of the Department of Marine and Fisheries for permits, under the Migratory Birds Convention Act, to kill certain migratory birds while damaging fishing interests in the vicinity of the Government Hatcheries in British Columbia. In accordance with this request permits were issued in favour of the Superintendent in charge of the Hatcheries at Henderson Lake, Kennedy Lake, Harrison Lake and River's Inlet respectively and I was instructed to communicate with these officers in order to obtain data relative to the alleged damage. The returns which subsequently were received in connection with these permits indicated that the greatest damage occurred at the Henderson Lake Hatchery. From the period between November 8th, 1920, and May 8th, 1921, and from January 1st, 1922, to April 8th, 1922, the following birds were killed in the vicinity of the Hatchery, viz.: 60 Mergansers, 336 Golden-eyes, 10 Mallard, 21 Buffle-heads, 12 Scoters and 1 Gull. It was felt that the destruction of such a large number of birds, some of them valuable game species, could be justified only if they were making serious inroads on the fry liberated from the hatchery or if feeding extensively on live spawn on the natural spawning beds.

An attempt was made to secure all the birds which were killed under permits at Henderson Lake in order that the contents of their stomachs might be analysed but owing to the isolated position of the hatchery, involving the question of transport, this was found impracticable. I succeeded in obtaining only six specimens and the information received from these was too meagre to be of much practical value. Realizing that a much larger number of birds would be required in an investigation of this kind and being convinced that stomach analyses alone could not afford sufficient data upon which to base a conclusion regarding the economic status of the species concerned, I recommended that the question be studied in the field. In response to my letter addressed to the Commissioner, in this connection, I was instructed to proceed with such work when the opportunity offered. With this object in view I proceeded to Henderson Lake on November 9th, 1922, via the Esquimalt and Nanaimo Railroad from Victoria to Port Alberni and the Fishery Department's launch *Egret* from Port Alberni to Kildonan. At this point I was met by the Superintendent of the Henderson Lake Hatchery, Mr. David Bothwell, and after ascending the Henderson River by row boat we continued our journey to the head of Henderson Lake in the Hatchery Launch *Ruby*. Accommodation was received at the Hatchery for the period between November 10th and December 8th, 1922, and in the investigations which were conducted over this period I was ably assisted by Mr. Bothwell.

GENERAL DESCRIPTION OF THE DISTRICT.

Henderson Lake.

Henderson Lake is named after Captain John Henderson, master of the barquentine *Woodpecker*, which brought out the machinery from England for the Alberni Saw Mill Company in 1860. It is known as Anderson Lake by the Department of Marine and Fisheries and by the residents of the district, but the former name is the correct one.

It is situated north of Uchucklesit Harbour, Barclay Sound, on the West Coast of Vancouver Island, and connected with the salt water by the Henderson River, a narrow, rapid stream about one mile long. Leaving Uchucklesit Harbour to ascend the river one passes through a short canyon, a mere cleft in the rock, where at high tide there is but little current. Above this are three hundred yards or more of rapid water. At slack tide a small boat can be dragged or poled up stream, but when there is a combination of high water in the

lake with an ebb tide it is necessary to portage. The river is not navigable for motor boats at any time. High tides ascend the river about three-quarters of a mile, but rarely reach the lake, which is twelve feet above sea level.

This picturesque lake occupies a narrow, crescent-shaped valley approximately twelve miles long and varying between one-half and three-quarters of a mile in width. The water is clear and very deep—over 900 feet has been found in several places—and rocky timbered mountains, the conifers being represented. Western red cedars of venerable age stand solitary amongst the more abundant western hemlock and Douglas fir—of lesser girth but dwarfing the cedars in height. Sitka spruce, western white pine and Amabilis fir are also fairly common and occasionally a small yellow cypress is met with. A few hardwoods near the lake shore, notably some ancient broad-leaf maples, have their rough bark hung with vivid green moss and ferns as have many of the larger conifers. Sitka alder, Oregon crab-



Henderson Lake—Looking South from Hatchery

rising precipitously, form its shore-line. At the south end of the lake these mountains are approximately fifteen hundred to two thousand feet high; northward they increase in height and ruggedness. The head of the valley is overshadowed by lofty peaks, probably five thousand feet high, which were snow-capped when I first saw them on November 11th. They shut out much of the sunlight in the winter months and when the body of the sun drops behind this rampart, which it does before noon, the air is immediately chilled.

A small clearing in a narrow timbered flat at the north end of the lake is occupied by the Dominion Government Fish Hatchery buildings, Ternan Creek, a small stream, from which comes the water used in the Hatchery, enters the lake at this point and a quarter of a mile to the east at the edge of the valley and in the north-east corner of the lake is the outlet of Clements Creek, a stream of considerable size. The flat is covered with dense tangled forest of the region, most of apple and willow constitute the balance of the deciduous timber. The floor of the forest is piled high with a confusion of wind-falls, the interstices often choked with devil's club, huckleberry and salmon-berry. The ground and much of the wind-fallen timber are deeply insulated with moss and a luxuriant growth of ferns of various species is general. On the surrounding hills the predominating tree appeared to be Douglas fir on the lower portions succeeded by lodge-pole pine near the summits.

The local annual precipitation is about 110 inches and rains are torrential. After an hour's deluge every hill is lined with silvery cascades of water, dashing into foam over the smooth rocks and conspicuously white between the serried ranks of firs, even in the murk and fog of a rain storm. These streams increase rapidly in volume as the rain continues and the accompanying noise, at first a murmur, grows to a dull insistent roar which dominates all other sounds.

Usually in January and February there is a snow-fall of from four to five feet at the north end of the lake, where it is said the heaviest fall occurs. This is not accompanied by very low temperature as a rule, zero being probably the minimum. There are no settlers on the lake; the only inhabitants of the district are the employees at the Hatchery. The nearest settlement is at Kildonan on Uchucklesit Harbour.

CLEMENTS CREEK.

This is a typical Vancouver Island stream, swift and crystal clear, having innumerable small rapids, quiet pools and eddies and here and there wide shallow stretches with gravelly bottom where the salmon scoop holes for their nests. For half a mile or so above the mouth, which is divided by a high gravel bar, the stream has a breadth of about forty yards and is navigable for canoes. Except in a few riffles it was too deep for wading during the time I spent in the district.

Clements Creek enters the lake at the north-east corner, flowing along the east side of the timbered flat referred to above. Steep cut-banks to fifteen feet in height occur at intervals but for the most part the shores are not high enough to prevent ovreflowing during the periodic freshets. A portion of the flat adjoining the mouth of the creek, being only slightly higher than the lake, is subject to inundation. This area is cut through by channels which communicate with the creek at high water and the intervening spaces are grown up with willow and with western hemlock and Sitka spruce on the few high knolls. It was surprising to note how quickly these dry channels filled after a few hours rain and how the salmon rushed in at such times, often to be left stranded before they had finished spawning, as the water usually drained out again in a day or so.

Close to the water's edge grow large Sitka alders, singly as a rule, but in several places there are fair sized stands with a dense under-growth of salmonberry and devil's club. These trees, however, appear insignificant—a fringe of deciduous growth on the coniferous forest which towers on either side of the creek. While studying the feeding habits of Ducks and Gulls I spent considerable time along this stream, and at certain points was seemingly walled in by forest on all sides. The creek bed appeared as the bottom of a deep canyon with irregular flexible walls of sombre green. To the south, across Henderson Lake, a gloomy mountain with jagged snow peaks seemed the end of this forest canyon, while to the north the view was shut off by a turn in the river. It frequently happened that the entire open space within view was filled with a great wheeling multitude of snowy-breasted Gulls, their raucous cries drowning the noise of the waters.

About a mile from the mouth of the creek a weir has been built to hold back salmon until a sufficient number have been stripped to supply the eggs required at the Hatchery. There is a good trail close to the stream as far as this weir, but beyond, travel is impossible along the creek bed, and slow and difficult through the dense forest with its floor of slippery moss-covered rocks and fallen timber. Even on the few bright mornings this forest was shrouded in mist and dripping with moisture. The pale November sun penetrated only for an hour or so, in diffused wavering ribbons which traced a checkered pattern of light and shadow on the dark mossy tree trunks and the glistening leaves and ferns underfoot. On a day of rain it was chill and sodden, rivulets of water filled every declivity and the ground was like a sponge, while a roof of rain-cloud low down on the mountain sides seemingly rested on the tree tops. Few birds broke the stillness. Sometimes a Raven or a Jay was heard, occasionally a Seattle Wren, and more often the sibilant lisping of Chestnut-backed Chickadees.

BIRD-LIFE OF THE REGION.

The coniferous forests of the West Coast of Vancouver Island are not prolific in bird-life and it was not expected that a variety of species or a number of individuals would be encountered, especially during the winter season; the actual census of land birds, however, was even more meagre than had been anticipated. The two most common species were the Chestnut-backed Chickadee and the Western Golden-crowned Kinglet; these being frequently heard or seen in the thick timber along Clements Creek. Six Stellar's Jays, remarkably unobtrusive, were noted on several occasions and one Song Sparrow, one Oregon Junco, one Western Winter Wren and one California Creeper were seen frequently in the vicinity of the Hatchery. Two Harris's Woodpeckers were recorded and two Northwestern Crows visited the beach in front of the Hatchery on November 12th, but did not appear again. Six Ravens frequented the heavy timber along Clements Creek, apparently attracted by the dead salmon, although they were never seen taking this food. Two Bald Eagles, three Kingfishers, several Seattle Wrens and Dippers complete the census of land birds.

(*Concluded in the September issue*)

THE ALPINE MAIDENHAIR FERN (Adiantum pedatum L. Var. aleuticum Rupr.) AT HATLEY, STANSTEAD COUNTY, QUEBEC.

By HENRY MOUSLEY

IN *The American Fern Journal* for October-December, 1922, the finding of the above fern in northern Vermont, in 1921, is described as one of the most interesting discoveries made in the eastern United States in recent years. If this be so, then its discovery at the foot of Mount Orford, Quebec, on September 20, 1920, by Mrs. L. Frances Jolley, of Berkshire, Vermont, and at Hatley, on August 30th, of the same year, by myself, I suppose is equally interesting, more especially so since the elevation at which our specimens were found (1,000 feet above sea level) may be the lowest on record.

I find on examining the material in the National Herbarium of Canada, Victoria Memorial Museum, Ottawa, that, previous to the above dates, the fern had been found only in the following localities, viz:—Mount Albert, Shickshock Mountains, P.Q., Macoun, August 27, 1882; Mount Albert (3,280 ft.) P.Q., J. F. Collins and M. L. Fernald, August 9, 1905; Black Lake, Megantic County, P.Q., M. L. Fernald and H. B. Jackson, August, 1915; Bonne Bay (1,247 ft.) W. Newfoundland, M. L. Fernald and K. M. Wiegand, August, 1910; Ymir district, B.C., W. C. Sandercock, 1914; Cascade Range (5,500 ft.), B.C., J. M. Macoun, August, 1916; Prince Rupert, B.C., J. M. Macoun, June, 1917.

I first saw an account of the matter in the October (1922) issue of the *Joint Bulletin of the Vermont Botanical and Bird Clubs*, in which Mrs. Jolley tells of her experience as follows:

> "*Adiantum pedatum* var. *aleuticum* was "first found by me two years ago in Canada "at the foot of Orford Mountain. There it "grows in great abundance and from 12 to 18 "inches high and nearly as far across the "fronds. I showed some specimens to C. H. "Knowlton and he agreed with me that it "certainly was different from common *Adian-"tum pedatum* and took specimens to the "Gray Herbarium for identification. They "immediately said it was *Adiantum pedatum* "var. *aleuticum*, found usually more to the "north and west and in high altitudes.
>
> "Now I desired to find it in Vermont and, "knowing that Belvidere Mountain in Eden "was in the same range and of the same asbes-"tos formation as Orford, I went there to look "for it. To my joy I found it in abundance "and beautiful plants. I now have plants "from both stations growing in my garden. "This last July several members of the "Vermont Botanical Club visited the Eden "station and collected specimens."

In the same publication Nellie F. Flynn says:

> "The differences between *Adiantum peda-"tum* and its variety *aleuticum* are as follows: "Typical maidenhair fern has the pinnae "spreading horizontally, with the pinnules "oblong and having rounded ends. It grows "in moist shady soil. Var. *aleuticum* grows "in crevices of rock in full sunshine. The "pinnae are much more upright. The "pinnules are wing-shaped and have pointed "ends. The plant is of thicker texture and "more heavily fruited than the type."

On reading the above, and also the account in *The American Fern Journal*, Vol. 12, No. 4, 1922, in which an illustration of var. *aleuticum* is given, I remembered having collected and very carefully pressed two fronds of the Maidenhair Fern on August 30, 1920, which struck me at the time as differing from the type. On arrival home I looked up Gray's *Manual*, 7th edition, but as I found no mention of any variety of *Adiantum pedatum*, my two examples were put away for further consideration, but owing to the pressure of other matters were forgotten, until Mrs. Jolley's discovery was announced. This caused me again to examine my specimens, when to my surprise I found that they were var. *aleuticum*. I at once wrote to Mrs. Jolley, giving her the specific date of my discovery, and asking for hers, as up to that time this information had not been published. Although it has since transpired that my date anticipated Mrs. Jolley's by practically a fortnight, the honour rests entirely with that lady for having first brought the matter to light, as well as for being the first one to discover the variety in the Eastern United States.

The asbestos formation in which the var. *aleuticum* occurs is part of the Serpentine belt, which extends from the Chaudiere River to the Province line in Brome County. Mount Orford, Owl's Head, and the other mountains around Hatley, as well as Belvidere Mountain in Vermont (where Mrs. Jolley found var. *aleuticum* on July 17th, 1921, at an elevation of 2,244 feet), belong to this igneous Serpentine belt, which although really in the Appalachian district is technically not a part of it. Asbestos is one of the altered (metamorphosed) products of the original igneous "magma" which welled up through a "line of weakness" in the earth's crust, due, no doubt, to the Appalachian movement, and it is near one of these asbestos mines on Belvidere Mountain that Mrs. Jolley found her plants.

The great Appalachian mountain system extends from the Gulf States to Newfoundland, receiving different names in different parts of the United States and Canada. In Vermont the Green Mountains, in which Mount Belvidere is situated, are part of the system, but on entering Canada this range is known as the Notre Dame Mountains, extending to about thirty miles south of Quebec, thence passing up the Gaspé Peninsula where they receive the Indian name of the Shickshocks. It is in this latter range that Mount Albert is situated, and there on the high table land this interesting variety *aleuticum* covers some hundreds of acres of alpine ground.

From the material I have so far examined, it would appear that the blue-green colouring of the fronds is by no means a constant character; neither is the size of the plants to be relied upon. Prof. M. L. Fernald in *Rhodora*, Vol. VII, 1905, No. 83, pp. 190-192, speaks of the stipes of the plants from Mount Albert as rarely exceeding 2 dm. in height, often scarcely 1 dm., though exceptional clumps have stipes fully 2.5 dm. tall, whilst the blue-green fronds range from 0.5 to 2 dm. in width. Mrs. Jolley on the other hand speaks of beautiful plants from 3 dm. to 4.5 dm. tall, and nearly as wide across the fronds. One of my examples is 4.5 dm. tall and 2.5 dm. across the frond, which is of a light green colour. Plants from the Cascade Range in British Columbia (5,500 feet) are very fragile and of a beautiful light green colour, ranging in height from 12 to 15 cm. only, with fronds from 4 to 6 cm. wide. The examples from Newfoundland, with the exception of two plants, are of a fresh green colour, as are also those from Prince Rupert and the Ymir district, B.C., whilst most of the examples from Mount Albert, Black Lake and Mount Orford, Quebec, and Mount Belvidere, Vermont, are of a blue-green. In all, however, the constant distinguishing characters appear to be the strongly ascending pinnae with wing-shaped pinnules, which latter in a fertile frond also appear to be more heavily fruited than in the type. It is this latter character which has a good deal to do with the pointedness or otherwise of the pinnules. If the fruiting extends to the extreme tip, then you get a sharp pointed pinnule, but if the latter happens to be deeply cleft and the last lobe is not fruited, then you get a somewhat hook-shaped looking pinnule, a matter which does not seem to have been noticed so far. The teeth at the tips of the pinnules of var. *aleuticum* are usually acute whilst those of *A. pedatum* are more rounded.

At present I am not in a position to say much about the distribution of this variety at Hatley, but it is hoped during the coming season to pay special attention to the matter, as well as to the general size, colouring and texture of the fronds, which no doubt vary according to the elevation, exposure to the sun or near proximity to asbestos veins or otherwise. In all probability transition forms will be found here similar to the one on sheet No. 95212 in the National Herbarium collected by Prof. Fernald at Caribou Lake, Megantic County, Quebec, in August, 1915, which is of a light green colour, the plant being 7 dm. in height with a frond 3.5 dm. in width. In this plant also, many of the pinnules are somewhat deeply cleft with the last lobe at the tips of the pinnules unfruited as already described.

THE PILEATED WOODPECKER

By J. A. MUNRO

THE Pileated Woodpecker—the aristocrat of the Woodpecker family—would fittingly serve as an emblem for our Canadian heritage of timbered solitudes. A hermit by instinct, shunning the company of his lesser relatives, he seeks in lonely and quiet enjoyment the fastnesses of the heavy timber. Avoiding the constricted wood-lot and the forests of coniferous second growth, he makes no truce with civilization and retires to greater seclusion as the logging gang and settler encroach upon his natural territory. Through the silence of the ancient woods his mating call resounds—a reverberating tattoo—whilst his echoing blows as he chisels into a tree for some boring grub arrest attention and the flash of vivid scarlet as he flies through the trees, momentarily vitalizing the wilderness, gives a pleasurable thrill to the fortunate traveller.

He is the largest of our Canadian Woodpeckers; the scarlet crest and white wing-patches displayed conspicuously against the predominating black of his plumage serve to distinguish him from all other members of the family. The woodsman and the pioneer identify him by a variety of names, the most popular being Log-cock, Woodcock and Redheaded Woodpecker. Such a plenitude of vernacular indicates the interest he creates—an interest that is apparent even among those in whom bird-life arouses no special enthusiasm.

Like many other species of Woodpecker the Pileated may be seen at all seasons of the year, but it is most likely that wintering birds are not



"THE PILEATED WOODPECKER"

the individuals present during the summer for there is a migratory movement in spring and autumn. During the winter they have their regular beats or patrols through certain stands of timber—patrols in the sense that the birds are acting as guardians of our timber, for they spend their lives in hunting down and destroying the boring grubs that menace our forests. When their day's work is over and their hunger satisfied the Woodpeckers retire to certain old nesting holes where, secure from predatory animals and Horned Owls, they pass the long winter night in warmth.

and safety. They reach their roosts early in the evening by the same route through the forest and at about the same time each day. Their approach is usually heralded by a loud, harsh *Kak, Kak, Kak*, a spirited cry of great carrying power that is seldom used during the day.

In southern British Columbia nesting begins early in May. The nest is a chiselled hole in a tree, fourteen to eighteen inches deep, cut occasionally in a green cottonwood or poplar, more often in a dead pine or fir, and rarely in any but the tallest trees and at a considerable distance above the ground. On a cushion of fine chips three or four rose-white eggs are laid. The young Woodpeckers are able to fly about the time the dogwood berries and other wild fruits are ripe, these forming a part of their food supply. Like many other birds that feed almost exclusively on insects, a certain amount of acid vegetable food is essential to their well-being, but under no conditions have they been known to attack cultivated fruit.

The old nests may be used for a number of years both for breeding and roosting. Sometimes, however, flying squirrels will pre-empt them for their winter quarters, lining them with shredded bark or moss to the discomfiture of the Woodpeckers. Again if the nesting trees are close to a mountain lake the holes may be used by Buffleheads and other tree-nesting Ducks, when a few years of decay have enlarged the openings sufficiently to allow the entrance of these larger birds. By providing these safe nesting sites the Pileated Woodpecker plays an important part in the conservation of certain valuable species of migratory game birds.

This bird feeds largely on the larvæ or grubs of various species of bark-beetles, which are responsible for an enormous destruction of timber in our coniferous forests. The stately yellow pine, considered by many the most beautiful of our conifers, is particularly subject to the attack of these insects and a badly infested tree may be killed in two seasons. An extensive outbreak of *Dendroctonus* beetles in British Columbia during recent years has been checked and many million feet of valuable timber saved through the work of the Pileated Woodpeckers and their lesser relatives.

The larvæ of wood-borers, a group of beetles which attack felled timber, are also eagerly sought by this industrious forester. Wood-boring beetles of various genera lay their eggs in the bark of dead standing timber or in saw-logs that have been left in the woods and the resultant larvæ bore into the sapwood where they make complicated gallery systems. The wood-dust manufactured during these excavations is ejected through various entrance tunnels in the bark and falls groundward to accumulate in little heaps. This is the outward evidence that grubs are at work and the log or tree in process of dissolution, soon to be rendered unmarketable. But should there also be saucer or cone-shaped cavities in the bark of the infested tree, such marks indicate that the Pileated Woodpecker has arrived to save the situation.

During the winter months, when such insects are at the lowest ebb of their life cycle, the Woodpeckers' work is particularly effective, as then they destroy the potential parents of a host of these pests. As wood-boring larvæ carry on their destructive work under the bark or in the sapwood of the tree they are safe from other bird enemies. But the Woodpecker is equipped with highly specialized tools for climbing trees and for cutting into the wood in quest of its natural prey. Its strong, sturdy feet are provided with four powerful toes, two placed in front and two behind, and these enable the bird to cling securely to the bark of the tree during drilling operations. Its balance and rigidity is further maintained by the stiff quills in the tail which act as a brace against the tree. The bill suggests a chisel in shape and is so used, as, clinging securely to the bark with widespread toes and supported by the unbending tail, the Woodpecker delivers vigorous blows with its bill, while chips fly out and litter the ground below. Soon the chamber of the larva is exposed and the insect drawn out and swallowed whole. The Woodpecker's tongue is perhaps more highly specialized than any other of its organs. It is long, slender and nearly cylindrical; the upper surface furnished with small spines pointing backward, while the tip is a spear-point, hard as bone. In its structure and use the tongue suggests an Indian fish spear, or the tiny instrument used by a dental surgeon to remove a dead nerve from a molar. A more ingenious instrument for transfixing larvæ cannot be imagined. The insect is literally speared; the sharp point pierces the tough integuments, while the barbs grip and hold until the impaled insect is extracted.

The family of Woodpeckers as a whole enjoys comparative immunity from the aggression of mankind. They exhibit none of the qualities that would make them objects of sport and they are too small to be used for food. But the handsome conspicuous Pileated, never particularly common, has been so often the victim of the hunter's desire for a trophy that it has disappeared from many districts where conditions are suitable for its increase. In other localities it is fast approaching extirpation. Usually it shows little fear of man and when its resounding tapping has drawn an

observer within close range, the chiselling and hammering is continued heedless of the intruder. To the stranger in the woods, perhaps a city sportsman on his annual deer hunt, the sight of this powerful, flame-crested bird makes an irresistible appeal. Possibly it is the first large bird seen by the hunter in the lonely autumn woods. Perhaps he has heard it spoken of by its universal and incorrect name of Woodcock. In any case, it has an attraction that few other birds offer and far too often the hunter has coveted the handsome bird as a memento of his vacation. This desire, however, must be restrained, otherwise, not only will a fine bird be lost to the forests, but an illegal act would be committed. The killing or possession of these birds is prohibited at all times by the Migratory Birds Convention Act and by the provincial laws. If these splendid birds, so characteristic of our northern forests are to be preserved, sportsmen must not only refrain from killing them, but must co-operate in their protection.

SOME FRESHWATER CRUSTACEANS FROM BRITISH COLUMBIA

By MR. AND MRS. T. L. THACKER

THE following notes on the smaller fresh water crustaceans are based on observations made chiefly in the years 1918, 1920, and 1921. The area to which they refer is the uppermost twenty-five miles of the lower Fraser Valley, extending from Yale Creek on the north to Jones' Creek, near Laidlaw.

Only lakes and ponds easily accessible have been collected from, and all these are at low elevations, except the Frozen Lakes at Yale (3500 ft.) and Jones' Lake, near Laidlaw (2200 ft.).

There are, of course, many other lakes, of some of which we have definite knowledge; others are known only by rumour, while there are doubtless still others entirely unknown.

We collected from certain of the lakes at fairly regular intervals during more than one season, whereas we have been able to get only one catch from others, so that we hesitate about making definite statements of seasonal frequency. Seventy-eight collections have been examined, from twenty different localities.

In this issue we will confine ourselves to the Copepods. Dr. C. Dwight Marsh, Washington, D.C., very kindly determined the species for us from specimens which we sent him.

FAMILY *Centropagidæ.*

Epischura nevadensis, Lillj.—Kawkawa Lake, Hope. 20 August, 1921.

Occurs plentifully during summer months in three rather deep lakes below 200 ft. elevation.

Diaptomus shoshone Forbes. Lower Frozen Lake, Yale. 15 October, 1921.

Well distributed over the district.

FAMILY *Cyclopidæ.*

Cyclops americanus Marsh. Murderers' Bar Slough, Hope. 1 September, 1921.

Generally distributed below 1000 ft., but nowhere found to occur in great numbers.

C. bicuspidatus Claus. Texas Lake, Choate. 10 November, 1921.

Common in large permanent sheets of water.

C. albidus Jurine. Little Lake, Hope. 18 August, 1921.

Taken practically everywhere.

C. modestus Herrick. Silver Lake, Hope. 9 October, 1921.

A rare species taken on four occasions only in rather deep lakes. Was most plentiful in a fishing made through the ice in the depth of winter.

C. serrulatus Fischer. Little Lake, Hope. 18 August, 1921.

C. serrulatus elegans Herrick. Lake Schkam, Haig. 29 August, 1921.

Common everywhere; the form depending upon the habitat.

C. prasinus Fischer. Little Lake, Hope. 9 September, 1921.

Regularly met with in larger lakes at a low elevation.

C. phaleratus Koch. Texas Lake, Choate. 2 October, 1921.

Found occasionally in the shallower parts of permanent lakes.

C. bicolor Sars. Big Slough, Little Mountain, Hope. 21 April, 1918.

Taken in this slough only, on two occasions.

C. fimbriatus Fischer. Choate Slough, Choate 2 October, 1921.

In permanent lakes to the highest elevation.

FAMILY *Harpacticidæ.*

Two species of the genus *Canthocamptus*, which Dr. Marsh, owing to the present uncertainty regarding this genus, did not definitely name, occur here. He names them provisionally as

Canthocamptus staphylinoides Pearse. Devil's Lake, Haig. 22 September, 1921.

Commonly met with in all suitable localities.

C. hiemalis Pearse. Upper Frozen Lake, Yale. 15 October, 1921.

A much smaller species than *C. staphylinoides*. Occurs less often; in deeper lakes at various elevations.

(To be continued.)

NOTES ON THE BIRDS AND MAMMALS OF BRENT AND VICINITY, ALGONQUIN PARK, ONTARIO, JULY AND AUGUST, 1922

By L. L. SNYDER and J. L. BAILLIE.

WHILE carrying on the work of an expedition from the Royal Ontario Museum of Zoology, in the northern part of Algonquin Park, the writers had an opportunity, incidental to the major work, to make numerous observations on the birds and mammals of the district. Although the following list is recognized as incomplete it is of interest since it pertains to a definite and little-visited part of Algonquin Park. The actual territory covered was from Brent northwest to Couchon Lake, north to an area outside the Park borders around Gilmour Lake and south along the Petawawa River to what is known as the head of the "five mile" portage.

Brent, a divisional point on the Canadian National Railway, is the largest settlement in the district visited. Three other stations lie in this area; namely, Government Park, Daventry and Couchon. Government Park is but a siding with a house for section men; Daventry and Couchon each have a saw-mill employing a few men, but neither exceeds Brent in population, the summer inhabitants of the latter being probably 50, composed of railroad employees, rangers, and a few transients. The inhabitants do not, to any appreciable extent, influence the fauna of the district, because of its incorporation in a protected area, but the cleared spaces have affected the life by changing the ecological conditions.

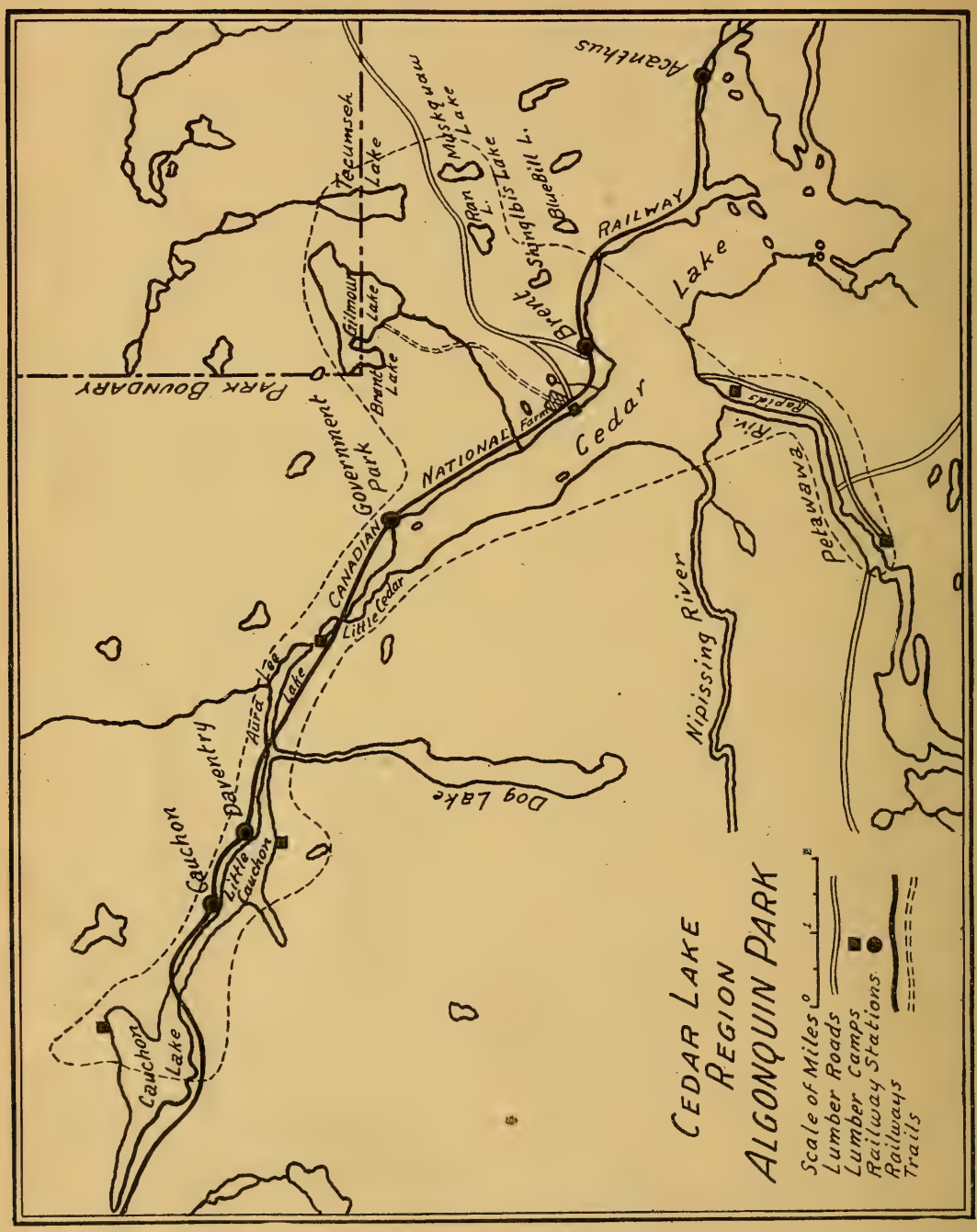
There are six lumber-camps with their necessary clearings scattered through the district, two being abandoned, three used irregularly by logging gangs and one the permanent residence of the Park and Fire Rangers. A small abandoned farm, now practically reclaimed by second-growth, is situated on the north shore of Cedar Lake, about one mile west of Brent. It was near this farm that our camp was situated.

The general physiography of the region is that of a series of irregular, tree-covered rock ridges, varrying in height from fifty to two hundred feet, these being cut at some places by small streams, outlets to the lakes which lie between the promontories. The bodies of water vary in size from small beaver-ponds to large open lakes, Cedar Lake, the largest, being approximately nine miles long and two miles across at the widest point. These lakes lie more or less in a chain, the general direction of drainage being to the southwest. The larger lakes, for the most part, are bordered with boulders (due to the shove of shore ice in winter) but occasional stretches of sand beaches may be seen, a rather extensive one being found on the south shore of Gilmour Lake. The water of these lakes is clear and cool with little or no source of pollution. No extensive marshes lie in this area but some shallow bays, the flood-lands at the mouth of the Nipissing River and numerous beaver-ponds afford a restricted habitat for marsh-dwelling forms.

The forest, mainly of second growth, is composed chiefly of white spruce, balsam fir, white and red pine, white cedar, hard maple, paper and yellow birch, and quaking aspen with an undergrowth of striped and mountain maple, beaked hazel, etc. In suitable situations also may be found tamarack, black spruce, hemlock, willows, large-toothed aspen, balsam poplar, alder, ironwood, beech, red maple, basswood and ash. Cut through this growth are a few old lumber roads and trails used by loggers and fire-rangers. Along the north side of the railroad, extending from our camp northwest to beyond the region covered considerable tracts have been burned over, exposing the true contour of the country and suggesting the real physiographical conditions which are so well concealed by the forest. These areas were almost devoid of the higher forms of life but plant-life seemed to have found new possibilities and vegetation had spread rapidly over the thin soil which sparsely covered the rock.

The season was moderate, with no excessive heat or rainfall, and provided most favorable conditions for life in general. Two heavy windstorms, accompanied by rain, a few hot days, and, late in the season, cold nights, were to be expected and did not disturb the average conditions of the season.

No one time of day or season was set aside for making these observations, but notes were made as opportunity occurred during our stay; on canoe trips, on tramps and while carrying on our work about camp. With the exception of a few young, injured or dead specimens picked up, our records were made by sight or sign. These in-



stances will be noted in the following list.

We prefer to omit all species that were not actually met with, or in evidence by sign or sound, even though they are said by residents to inhabit the district. Questionable sub-species will be marked as such since no material was collected to make certain of their identity. Certain species which we expected to find, such as the Spruce Partridge, Pileated Woodpecker, Northern Raven, American Otter, Fisher and Weasel, etc., were not met with at any time during our stay although suitable habitats are to be found within the area.

It is quite probable that a number of species could have been added to the list if it had been possible to make a systematic collection in the district.

An outstanding disappointment of the trip was the very evident scarcity of mammals in this protected area, where one would imagine they should have ample opportunity to multiply and flourish.

BIRDS.

1. *Colymbus auritus* Linn. HORNED GREBE.—One female and several young were seen on Cedar Lake, July 6. This family was probably reared at the northwest end of Cedar Lake where there are some small islands and shallow, grassy bays.

2. *Podilymbus podiceps* (Linn.) PIED-BILLED GREBE.—One was seen near Government Park in a shallow bay of Cedar Lake.

3. *Gavia immer* (Brunn.) LOON.—Common on all the larger lakes. Frequently seen in flocks of from four to ten. Two young about one-third grown were seen as late as August 10. On several occasions single Loons were seen flying overland uttering their startling cry. They probably change feeding grounds more often than is supposed. An injured adult was captured and upon examination we found a broken wing infested with dipterous larvæ, probably those of a Sarcophagid.

4. *Larus argentatus* Pont. HERRING GULL.—This species fed along Cedar Lake and was not uncommon late in the season. On foggy mornings they were especially noisy, a flock of six or less seeming to be great numbers.

5. *Mergus serrator* Linn. RED-BREASTED MERGANSER.—Females of this species were commonly seen on the lake escorting from 8 to as many as 15 young. Males were not seen at any time but single females were observed on the smaller inland ponds. A young specimen was picked up almost dead on the railroad track a short distance from water.

6. *Anas rubripes* Brewst. BLACK DUCK.—Two of this species were seen on a small beaver-pond on August 20.

7. *Botaurus lentiginosus* (Montag.) AMERICAN BITTERN.—This species was frequently seen in a small marshy bay on Cedar Lake, near camp, but the chances of having recorded the same individual several times were probable. Seen only once elsewhere.

8. *Ardea herodias* Linn. GREAT BLUE HERON.—Observed at different times feeding at the mouth of the Nipissing and in other suitable places, but it is not a common species.

9. *Actitis macularia* (Linn.) SPOTTED SANDPIPER.—Pairs were frequently seen along the shore above our camp and also on Couchon Lake.

10. *Bonasa umbellus togata* (Linn.) RUFFED GROUSE.—The Ruffed Grouse was common and well distributed throughout the district. A count of 54 was made on the trail from our camp to Gilmour Lake, a distance of some three miles. This included one adult male, the rest being females and young.

11. *Accipiter cooperi* (Bonap.) COOPER'S HAWK.—One seen August 20.

12. *Buteo platypterus* (Vieill.) BROAD-WINGED HAWK.—The characteristic notes of this Hawk were frequently heard in the woods between camp and Gilmour Lake.

13. *Falco sparverius sparverius* Linn. SPARROW HAWK.—Seen on several occasions in August between our camp and Brent.

14. *Strix varia varia* Barton. BARRED OWL.—Heard on several occasions at night in the heavily wooded regions to the north of our camp.

15. *Bubo virginianus* (Gmel.) Subsp? GREAT HORNED OWL.—Notes of this species were heard on three nights during August.

16. *Ceryle alcyon* (Linn.) BELTED KINGFISHER—The breeding grounds of this species were somewhat restricted, so it was comparatively scarce, but individuals were seen not uncommonly on Cedar Lake and adjacent beaver-ponds.

17. *Dryobates villosus* (Linn.) Subsp? HAIRY WOODPECKER.—Rather common; the majority of birds seen were either females or young. On two occasions this species was seen feeding on the ground in recently burned areas.

18. *Dryobates pubescens medianus* (Swains.) NORTHERN DOWNY WOODPECKER.—Fairly common through burned-over tracts.

19. *Picoides arcticus* (Swains.) ARCTIC THREE-TOED WOODPECKER.—Not uncommon and generally distributed.

20. *Sphyrapicus varius varius* (Linn.) YELLOW-BELLIED SAPSUCKER.—Not common; heard more often than seen.

21. *Colaptes auratus luteus* Bangs. NORTHERN FLICKER.—Fairly common in the more open woods.

22. *Antrostomus vociferus vociferus* (Wils.) WHIP-POOR-WILL.—Not common. It was heard on three occasions near camp.

23. *Chordeiles virginianus virginianus* (Gmel.) NIGHTHAWK.—Common everywhere. Dozens of them would circle and swoop about our heads in the evening during the earlier part of the season.

24. *Chætura pelagica* (Linn.) CHIMNEY SWIFT.—This species was not common, but a few apparently nested in hollow trees north of camp. No nests were found in disused cabins. On one occasion several were seen to alight on a dead paper birch tree.

25. *Archilochus colubris* (Linn.) RUBY-THROATED HUMMINGBIRD.—Fairly common after July 21st, when the first one was seen frequenting an evening primrose patch.

26. *Tyrannus tyrannus* (Linn.) KINGBIRD.—Not common. Several seen late in the season along the railroad track between our camp and Brent.

27. *Nuttallornis borealis* (Swains.) OLIVE-SIDED FLYCATCHER.—Rare. A singing bird was heard daily after July 18 in the semi-burned section back of camp.

28. *Myiochanes virens* (Linn.) WOOD PEWEE —Not common. Heard only on the trail to Gilmour Lake.

29. *Empidonax minimus* (W. M. & S. F. Baird.) LEAST FLYCATCHER.—Fairly common through the woods along the Brent to Gilmour trail. This species was noticeably not as partial to water borders as is usual.

30. *Cyanocitta cristata cristata* (Linn.) BLUE JAY.—Frequently heard or seen near Brent, but not common in the district as a whole.

31. *Perisoreus canadensis canadensis* (Linn.) CANADA JAY.—On several occasions this species approached us when we were visiting the wilder sections. It was, however, not a common bird in the district.

32. *Corvus brachyrhynchos brachyrhynchos* Brehm. CROW.—Frequently seen flying over camp.

33. *Molothrus ater ater* (Bodd.) COWBIRD.—Two of this species seen in a small pasture close to the park ranger's residence.

34. *Agelaius phœniceus phœniceus* (Linn.) RED-WINGED BLACKBIRD.—A few were seen in the smaller marshes which we visited.

35. *Icterus galbula* (Linn.) BALTIMORE ORIOLE —One male seen on July 11.

36. *Euphagus carolinus* (Mull.) RUSTY BLACKBIRD.—Small migrating flocks were seen late in July and early in August. A flock of 25 was seen on the shore of Couchon Lake, near Daventry, on August 16.

37. *Quiscalus quiscula æneus* Ridgw. BRONZED GRACKLE.—Large flocks were seen feeding near Daventry and Brent late in August.

38. *Carpodacus purpureus purpureus* (Gmel.) PURPLE FINCH.—Common, especially late in the season when the birds congregated in small flocks.

39. *Passer domesticus domesticus* (Linn.) ENGLISH SPARROW.—Common around the railroad yards at Brent, but not seen elsewhere.

40. *Loxia curvirostra minor* (Brehm.) AMERICAN CROSSBILL.—One seen at the south end of the "five mile" portage on August 30.

41. *Astragalinus tristis tristis* (Linn.) GOLDFINCH.—Common throughout the season. We heard this species utter a note new to us. The sound was a non-musical hiss similar to the stridulated notes of some insects, only of course, louder.

42. *Spinus pinus* (Wils.) PINE SISKIN.—Common, especially in August.

43. *Pœcetes gramineus gramineus* (Gmel.) VESPER SPARROW.—Seen on three occasions in the pasture near the ranger's residence.

44. *Zonotrichia alibicollis* (Gmel.) WHITE-THROATED SPARROW.—Common throughout the season. In observing the variation of song in this species we made a count of the triplets which make up its song exclusive of the two or three prelude notes. One individual repeated this part fifteen times.

45. *Spizella passerina passerina* (Bech.) CHIPPING SPARROW.—Fairly common about the "Farm". A pair nested in a red pine tree near camp.

46. *Junco hyemalis hyemalis* (Linn.) SLATE-COLOURED JUNCO.—Fairly common but widely distributed through the district. A nest with young was found beneath bracken ferns near Gilmour Lake, July 19.

47. *Melospiza melodia melodia* (Wils.) SONG SPARROW.—Common in suitable locations.

48. *Melospiza georgiana* (Lath.) SWAMP SPARROW.—This species was heard singing on two occasions in the marsh bordering the beaver pond north of camp.

49. *Zamelodia ludoviciana* (Linn.) ROSE-BREASTED GROSBEAK.—Fairly common, especially around camp, where it fed on the fruit of the red-berried elder.

50. *Piranga erythromelas* Vieill. SCARLET TANAGER.—Heard in the woods along the Brent to Gilmour trail, where one male was seen. A pair bred in the pines not far from camp but only the female was seen. An injured young was picked up in front of camp, July 13.

51. *Hirundo erythrogaster* (Bodd.) BARN SWALLOW.—Common around out-buildings at the ranger's home.

52. *Iridoprocne bicolor* (Vieill.) TREE SWALLOW. —Single birds were seen, one near Daventry, one on Cedar Lake, and a migrating flock of 24 on August 7.

53. *Bombycilla cedrorum* Vieill. CEDAR WAXWING.—Common throughout the summer.

54. *Vireosylva olivacea* (Linn.) RED-EYED VIREO.—Common, especially in the deciduous growths.

55. *Mniotilta varia* (Linn.) BLACK AND WHITE WARBLER.—Seen on two occasions, one at Gilmour

Lake on July 31 and two at camp on August 3.

56. *Dendroica æstiva æstiva* (Gmel.) YELLOW WARBLER.—Fairly common in the willows along the track, between camp and Brent.

57. *Dendroica cærulescens cærulescens* (Gmel.) BLACK-THROATED BLUE WARBLER.—One was seen on the "five mile" road on August 30.

58. *Dendroica coronata* (Linn.) MYRTLE WARBLER.—This species was seen several times in different parts of the district.

59. *Dendroica magnolia* (Wils.) MAGNOLIA WARBLER.—Only one specimen seen, a male on July 6. It is probably more common than this single observation would indicate.

60. *Dendroica pensylvanica* (Linn.) CHESTNUT-SIDED WARBLER.—Nesting pairs were noted during July in two or three parts of the district.

61. *Dendroica fusca* (Mull.) BLACKBURNIAN WARBLER.—Noted on two occasions, a female near camp and a male on the "five mile" road.

62. *Dendroica vigorsi* (Aud.) PINE WARBLER —This species was seen and heard singing in the pines near camp on July 13 and 14.

63. *Seiurus aurocapillus* (Linn.) OVENBIRD.—Fairly common in the deep woods.

64. *Oporornis philadelphia* (Wils.) MOURNING WARBLER.—Fairly common, especially in the willows and poplars on the shore of Cedar Lake near Brent.

65. *Geothlypis trichas trichas* (Linn.) MARYLAND YELLOW-THROAT.—Common in suitable locations. The song of the Yellow-throat in this district is like that described by Chapman for the species near New York City.

66. *Setophaga ruticilla* (Linn.) REDSTART.—Fairly common in the trees bordering the track between camp and Brent. Noted also near an old lumber camp on Aura Lee Lake.

67. *Troglodytes aëdon aëdon* Vieill. HOUSE WREN.—Fairly common throughout the district.

68. *Nannus hiemalis* (Vieill.) WINTER WREN. —Fairly common in the dense undergrowth which occurred in different sections.

69. *Certhia familiaris americana* Bonap. BROWN CREEPER.—Frequently seen along the Brent-Gilmour trail. A young bird was picked up and examined on July 19.

70. *Sitta carolinensis carolinensis* Lath. WHITE-BREASTED NUTHATCH.—Twice seen near camp.

71. *Sitta canadensis* Linn. RED-BREASTED NUTHATCH.—Fairly common throughout the wooded areas.

72. *Penthestes atricapillus atricapillus* (Linn.) CHICKADEE.—Common. One was seen almost daily, escorting a family of young through the trees west of camp.

73. *Regulus satrapa satrapa* Licht. GOLDEN-CROWNED KINGLET.—Frequently seen in the coniferous sections of the district.

74. *Hylocichla fuscescens fuscescens* (Steph.) VEERY.—Seen in a few suitable locations and heard singing, but it was not a common bird.

75. *Hylocichla ustulata swainsoni* (Tschudi.) OLIVE-BACKED THRUSH.—Frequently heard and seen in the woods north of camp.

76. *Hylocichla guttata pallasi* (Cab.) HERMIT THRUSH.—Commonly seen and heard, especially in the woods north of acmp.

77. *Planesticus migratorius* (Linn.) ROBIN.—Fairly common. The Robin was seen to feed in the newly burned-over areas. The species is noticeably more cautious in woods than near habitations.

78. *Sialia sialis sialis* (Linn.) BLUEBIRD.—Noted on three occasions during July.

MAMMALS:

1. *Odocoileus virginianus borealis* Miller. NORTHERN WHITE-TAILED DEER.—Common. Frequently seen feeding on basswood and other tender sprouts in the burned-over areas. Their trails and signs were found everywhere. Twin fawns were seen on three occasions, the rangers maintaining that this is the usual number of young, a single fawn denoting that probably predacious animals or severe weather has destroyed one of the pair. The deer in this section are wild and do not allow close approach as do those in the more frequented parts of the park.

2. *Alces americanus* Jardine. MOOSE.—Rare. One was seen by section men one-half mile west of camp and upon searching the surrounding district we found droppings and tracks, but the animal had evidently left the district.

3. *Sciurus hudsonicus hudsonicus* Bangs. NORTHERN RED SQUIRREL.—Common.

4. *Tamias striatus lysteri* (Rich.) NORTHERN CHIPMUNK.—Common, especially around the clearings and about camp.

5. *Marmota monax canadensis* (Erx.) NORTHERN WOODCHUCK.—Rare in the district. Two burrows seen, at least one of which was inhabited, the rangers frequently seeing a groundhog near this burrow.

6. *Castor canadensis* Kuhl. CANADIAN BEAVER. —Only one individual seen, July 19. on the outlet of Gilmour Lake. Fresh signs were seen at two other places but the beaver is certainly not a common species, even though they were said to have been abundant only a year or so ago. Government trapping and the work of trappers on the border have greatly reduced their numbers. Unfortunately one of the most favorable beaver habitats in the district is just outside the park limits,

showing the uselessness of boundaries other than the natural ones.

7. *Peromyscus maniculatus* (Raf.) (Subsp?) WHITE-FOOTED MOUSE.—This species was seen on several occasions about camp, but the only specimen collected was destroyed by the ranger's dog, making sub-specific determination impossible.

8. *Ondatra zibethica* Linn. MUSKRAT.—One seen near the Petawawa Road late in August. This individual was a bank-dweller in a small flooded area connected with the Petawawa River.

9. *Napæozapus insignis* Miller (Sp.?) WOODLAND JUMPING MOUSE.—One seen August 20 While we were attempting to photograph this individual he escaped but we observed him for a sufficient length of time to make sure of his identity.

10. *Erethizon dorsatus* (Linn.) CANADA PORCUPINE.—Fairly common along the Petawawa Road and about the logging camps there. None seen in any other sections.

11. *Lepus americanus virginianus* (Harlan.) VARYING HARE.—Fairly common. Specimens examined were infested with wood ticks, especially on the ears and head.

12. *Vulpes fulvus* (Desmarest). RED FOX.—Apparently not common. We identified fox droppings on two occasions.

13. *Canis occidentalis* (Ritch.) GRAY WOLF.—A few roam through the district, although they are seldom seen in the summer. A wolf skeleton was found on the shore of Brant Lake. Tracks were seen on the Petawawa Road.

14. *Mustela vison* (Schreber). NORTHERN MINK.—Only two seen, one near Shinglbis Lake and one on Little Cedar Lake.

15. *Ursus americanus* Pallas. BLACK BEAR.—Said by the rangers to be common, especially south from Cedar Lake, but none were seen although they were diligently sought for. Fresh signs were seen only on three occasions, but old signs and marks were frequently noticed. The cardboard posters put up along the trails by the fire-rangers were invariably riddled by the bears, which have an aversion to such things. The abundance of food in the woods during the summer months made then less daring than at other times and their roamings were considerably restricted.

LIST OF BRITISH COLUMBIA HEPATICS

By A. H. BRINKMAN

COMPILED from Macoun's *Catalogue of Canadian Plants*, part 7, list of species of Hepatics in the National Herbarium, Ottawa, kindly supplied by Dr. M. O. Malte, list of additions kindly supplied by Dr. Evans, and my own gatherings. Dr. Evans' numerous writings and Dr. M. A. Howe's *Hepaticæ and Anthocerotes of California*, and Prof. W. H. Pearson's *List of Canadian Hepatics* are also sources from which this list has been compiled.

Species marked with an * are listed in J. Macoun's *Catalogue of Canadian Plants*, No. 7, or are in the National Herbarium, Ottawa, but have not been found by myself.

Species marked with a † have been found by myself and have so far not been recorded. Species not marked are listed in Macoun's *Catalogue* or are in the National Herbarium, Ottawa, and have also been found by myself. Other sources specially noted.

Riccia Beyrichiana Hampe
**Ricciella fluitans* (L.) A. Br.
Ricciocarpus natans (L.) Corda
†*Sauteria alpina* (Nees and Bisch.) Nees
Clevea hyalina (Sommerf.) Lindb.
**Reboulia hemisphærica* (L.) Raddi
**Targionia hypophylla* L.
**Asterella Lindenbergiana* (Corda) Lindb.
* " *Ludwigii* (Schwaegr.) Underw.
**Asterella saccata* (Wahl.) Evans
Conocephelum conicum (L.) Dum.
†*Bucegia romanica* Radian
Preissia quadrata (Scop.) Nees
Marchantia polymorpha L.
Metzgeria pubescens (Schrank) Raddi
* " *conjugata* Lindb.
Riccardia latifrons Lindb.
" *palmata* (Heow.) Carruth.
" *multifida* (L.) S. F. Gray
" *pinguis* (L.) S. F. Gray
* " *sinuata* (Dicks.) Trevis.
Pallavicinia Blyttii (Moerck) Lindb. A. W. Evans, *Bryologist*, 1910, p. 33.
**Pallavicinia Flotowiana* (Nees) Lindb. A. W. Evans, *Bryologist*, 1912, p. 55.
†*Pallavicinia hibernica* (Hook.) S. F. Gray
**Pellia epiphylla* (L.) Corda
" *Fabroniana* Raddi
† " *Neesiana* (Gottsche) Limpr.
**Blasia pusilla* L.
**Fossombronia longiseta* Aust.
* " *foveolata* Lindb.
Gymnomitrium concinnatum (Lightf.) Corda
* " *obtusum* (Lindb.) Pears.
† " *varians* (Lindb.) Schffn.
Marsupella emarginata (Ehrh.) Dum.
" *sparsifolia* (Lindb.) Dum.
* " *sphacelata* (Gieseke) Dum.

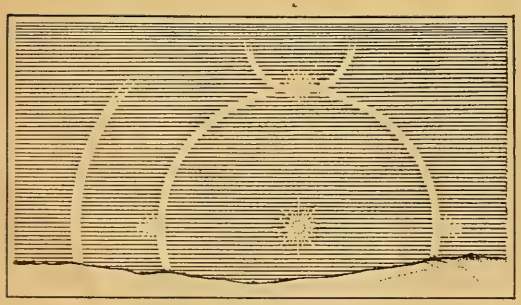
Marsupella Sullivantii (De Not.) Evans
† " *ustulata* (Hüben.) Spruce
Nardia Breidleri (Limpr.) Lindb.
† " *Geoscyphus* (De Not.) Lindb.
* " *obovata* (Nees) Carringt.
* " *rubra* (Gottsche) Evans A. W. Evans, *Bryologist*, 1919, p. 62.
**Nardia scalaris* (Schrad.) S. F. Gray
**Gyrothyra Underwoodiana*. M. A. Howe
Arnellia fennica (Gottsche) Lindb.
Jungermannia Allenii Clark A. W. Evans, *Bryologist*, 1910, p. 33. Neither in the National Herbarium, Ottawa, nor in my own.
Jungermannia atrovirens Dum.
" *cordifolia* Hook.
" *lanceolata* L.
" *pumila* With.
" *riparia* Tayl.
† " *Schiffneri* (Loitles) Evans
" *sphærocarpa* Hook.
Jamesoniella autumnalis (DC.) Steph.
Lophozia alpestris (Schleich.) Evans
† " *badensis* (Gottsche) Schiffn.
† " *attenuata* (Mart.) Dum.
" *barbata* (Schreb.) Dum.
† " *Binsteadii* (Kaalass) Evans
† " *confertifolia* Schiffn.
* " *excisa* (Dicks.) Dum.
" *Flœrkii* (Web. & Mohr.) Schiffn.
† " *guttulata* (Lindb. and Arnell) Evans
† " *Hatcheri* (Evans) Steph.
" *heterocolpa* (Thed.) M. A. Howe
" *Hornschuchiana* (Nees) Schiffn.
" *incisa* (Schrad.) Dum.
" *inflata* (Huds.) M. A. Howe
† " *Kaurini* (Limpr.) Steph.
" *Kunzeana* (Hüben.) Evans
† " *longiflora* (Nees) Schiffn.
" *longidens* (Lindb.) Macoun
" *lycopodioides* (Wallr.) Cogn.
" *Mülleri* (Nees) Dum.
† " *obtusa* (Lindb.) Evans
" *porphyroleuca* (Nees) Schiffn.
† " *quadriloba* (Lindb.) Evans
" *quinquedentata* (Huds.) Cogn.
" *Rutheana* (Limpr.) M. A. Howe
" *ventricosa* (Dicks.) Dum.
†*Sphenolosus exsectæformis* (Breidl.) Steph.
* " *exsectus* (Schmid.) Dum.
" *Hellerianus* (Nees) Steph.
" *Michauxii* (Web.) Steph.
" *minutus* (Crantz) Steph.
† " " var. *cuspidatus* Kaal. One record on boundary.
Sphenolosus politus (Nees) Steph.
† " *saxicola* (Schrad.) Steph.
" *scitulus* (Tayl.) Steph.
Sphenolosus ovatus (Dicks.) Schiffn. (*Diplophyllum ovatum.*)
Plagiochila asplenioides (L.) Dum.
Mylia anomala (Hook.) S. F. Gray
" *Taylori* (Hook.) S. F. Gray
Lophocolea cuspidata (Nees) Limpr.
" *heterophylla* (Schrad.) Dum.
" *minor* Nees
Chiloscyphus fragilis (Roth) Schiffn. A. W. Evans, *Rhodora*, 1912, p. 218.
Chiloscyphus pallescens (Ehrh.) Dum.
" *polyanthos* (L.) Corda
" *rivularis* (Schrad.) Lœske
Geocalyx graveolens (Schrad.) Nees
Harpanthus Flotowianus Nees
" *acutatus* (Web. and Mohr) Spruce
Cephalozia bicuspidata (L.) Dum.
* " *catenulata* (Hüben.) Spruce
* " *connivens* (Dicks.) Lindb.
* " *fluitans* (Nees) Spruce
* " *leucantha* Spruce
" *Macounii* Aust.
" *media* Lindb.
" *pleniceps* (Aust.) Lindb.
†*Cephaloziella bifida* (Schreb.) Schiffn.
" *byssacea* (Roth) Warnst.
† " *Brinkmanii* Douin
† " *elachista* (Jack) Schiffn.
† " *Hampeana* (Nees) Schiffn.
* " *papillosa* (Douin) Schiffn. Seas farm, near Victoria, and Agassiz.
†*Cephaloziella striatula* (C. Jens.) Douin
**Odontoschisma Gibbsiæ* Evans A. W. Evans *Postelsia*, p. 226.
†*Hygrobiella laxifolia* (Hook.) Spruce
Calypogeia Neesiana (Massal & Carest) K. Müll.
* " *suecica* (Arn. and Perss.) K. Müll.
" *trichomanis* (L.) Corda
**Bazzania triangularis* (Schleich.) Lindb.
† " *tricrenata* (Wahl.) Pears.
Pleuroclada albescens (Hook.) Spruce
Lepidozia filamentosa (Lehm. and Lindenb.) Lindenb. A. W. Evans, *Postelsia*, p. 227. Neither in the National Herbarium, Ottawa, nor in my own.
Lepidozia reptans (L.) Dum.
Blespharastoma trichophyllum (L.) Dum.
" *arachnoideum* M. A. Howe A. W. Evans, *Postelsia*, p. 227. Neither in the National Herbarium, Ottawa, nor in my own.
**Herberta Hutchinsiæ* (Gottsche) Evans
Ptilidium californicum (Aust.) Underw. & Cook
" *ciliare* (L.) Nees
† " *pulcherrimum* (Web.) Hampe
Diplophyllum albicans (L.) Trevis.
* " *argenteum* (Tayl.) Spruce
* " *obtusifolium* (Hook.) Dum.

**Diplophyllum plicatum* Lidnb.
" *taxifolium* (Wahl.) Dum.
Scapania americana K. Müll. A. W. Evans, *Postelsia*, p. 228. Neither in the National Herbarium, Ottawa, nor in my own.
Scapania Bolanderi Aust.
" *curta* (Mart.) Dum.
† " *cuspiduligera* (Nees) K. Müll.
" *dentata* Dum.
" *Evansii* Bryhn. A. W. Evans, *Postelsia*, p. 229. Neither in the National Herbarium, Ottawa, nor in my own.
**Scapania glaucocephala* (Tayl.) Aust.
" *irrigua* (Nees) Dum.
* " *nemorosa* (L.) Dum.
* " *Oakesii* Aust.
" *obliqua* (Arnell) Schiffn. Mount Arrowsmith specimen.
Scapania paludosa K. Müll.
" *subalpina* (Nees) Dum.
" *uliginosa* (Swartz) Dum.
" *umbrosa* (Schrad.) Dum.
" *undulata* (L.) Dum.
Radula complanata (L.) Dum.
" *Bolanderi* Gottsche
†*Porella Bolanderi* (Aust.) Pears.
" *navicularis* (Lehm. & Lindenb.) Lindb.
* " *pinnata* L.
" *platyphylla* (L.) Lindb. A. W. Evans, *Postelsia*, p. 231.
Porella rivularis (Nees) Trevis.
* " *Roellii* Steph.
**Cololejeunia Macounii* (Spruce) Evans
Frullania Bolanderi Aust.
* " *californa* (Aust.) Evans
* " *eboracensis* Gottsche
* " *franciscana* M. A. Howe
" *nisquallensis* Sulliv.
**Anthoceros fusiformis* Aust.
* " var. *stomatifer* Aust.

My part of above list was made possible by the work of Dr. C. H. Conklin, Dr. A. W. Evans, and Miss C. G. Haynes in naming the plants and in various other ways, and by Dr. A. W. Evans with additional records and notes. To all of them are my thanks due.

There remain records of British Columbia from various sources that I have not been able to get in touch with, and I shall be glad if any reader of above list can put me in touch with further records.

NOTES AND OBSERVATIONS



A CURIOUS HALO.—On Saturday, January 6, 1923, at 3.30 p.m., a curious halo was observed from the Canadian Pacific Railway line two miles past Ellwood Station, south of Ottawa. The sun was very brilliant and low on the horizon. Encircling it was a huge halo of white light. Intersecting the extreme top of the large halo was the lower half of a smaller one, with a bright mock-sun or parhelion at the point of contact. On either side of the sun, at the edge of the halo, was a mock-sun, somewhat almond-shaped. The inside of the halo, surrounding the mock-suns, was tinted a beautiful salmon colour and each parhelion contained tints of a bluish-green. To the left of the large halo, and describing not quite one-quarter of the arc from horizon to horizon, was a ribbon of spectrum colours, the red being on the side toward the sun. The sky was a typical winter sky, slightly flecked with cloud, and the phenomenon lasted almost twenty-five minutes.—C. E. JOHNSON.

MIGRATION OF THE SPECTACLED EIDER.—In the fall of 1921 I was shipwrecked on the coast of Siberia at Cape Lutke in Bering Strait, and was compelled to go into winter quarters at this place. We remained there until July, 1922.

There was some open water in Bering Strait all winter except for the month of February, 1922. At any time in the open water we could always see various species of Ducks. I noted the Spectacled Eiders in the fall through November and December, but during the months of January, February and March, although the natives of North Head reported that they had seen Ducks in the open leads in the ice, I did not see these myself and, therefore, cannot tell what species they were. But the spring migrations of the Spectacled Eider seemed to begin about the middle of April. From my journals I note that I saw the first Spectacled Eider on the seventeenth of April, 1922. On the twentieth I went out on the ice to a large lead of open water. This happened to be a fine calm day, unusual for this locality. This lead of open water I estimated to be about fifteen miles square. It was completely covered with Eider Ducks. The King Eiders were the most common by far; next in point of numbers were the Pacific Eider and there was a great number of Spectacled Eiders. At the same time I noted a few Steller's Eiders.

I hid between two ridges of ice and fired a rifle shot across the lead of water. The Ducks rose in a mass and began to circle around over this lead of water. I estimated the flock to be half a mile in width and miles long, and the flock was so thick that it obscured the sun. They did not see me as I was well hidden; they passed over my head

not more than fifteen feet above me. I had a splendid chance to identify the Ducks. I was amazed that there could still be in existence so many Spectacled Eiders.—JOSEPH F. BERNARD.

SPARROWS CAUGHT BY RATS.—At Hog's Back, Rideau River, Ontario, July, 1916, I observed a pair of Song Sparrows circling excitedly above a small hawthorn bush. On my approaching nearer, a house rat descended from the upper branches with a fledgling Song Sparrow. While I was searching hastily for a stick, the rat with its prey escaped in the surrounding grass. Another fledgling, not many hours from the nest, was perched on an upper branch of the same bush.

In April, 1919, while I was residing on Sunnyside Avenue, Ottawa South, a rat made its presence highly obnoxious by nightly revels between the partitions of the house. One evening the sounds of a scuffle, accompanied by an English Sparrow's distress notes, were audible between the ceiling and the roof of the sun-room. The bird could be plainly heard as the rat crossed over the ceiling and half-way down the wall with it. Next morning evidences of the tragedy were visible from outside. Part of a Sparrow's nest was hanging from a hole beneath a joist at a point where the commotion started.—C. E. JOHNSON.

WHITE-BREASTED NUTHATCH USING AN ELECTRIC-LIGHT POLE AS A FEEDING STATION.—From May 26 to August 5, 1922, a White-breasted Nuthatch was observed on many occasions, in Ottawa South, searching an electric-light pole from top to bottom for insects, which were presumably lured by the illumination at night and hidden in crevices by day. No trees of large size were nearer than several hundred feet and most of its trips to the pole were made in the early morning hours, as noted from a bed-room window.—C. E. JOHNSON

BOOK REVIEW

THE INLAND LAKES OF WISCONSIN. THE PLANKTON. ITS QUANTITY AND CHEMICAL COMPOSITION.—By E. A. Birge and Chancey Juday. *Bulletin No. 64, Wisc. Geol. and Nat. Hist. Survey, 1922, pp. 219.*

This is one of the most important works on the productivity of lakes which has yet appeared. The quantitative investigations of the net plancton and the nannoplancton (the minute organisms which escape through even the finest-meshed plancton net and which must be collected by centrifuging) extended over a period of six years, and the work on the chemical composition of the various organisms involved the making of 2,500 separate determinations. The authors reach the interesting conclusion that the amount of dry organic matter produced by the plancton of Lake Mendota, the body of water upon which most of the work was done, is 10,700 pounds per acre of surface per year. The data presented in this bulletin are of great interest to students of fresh water life in Canada, as the biota of the Wisconsin lakes is similar to that of many of our lakes.—A. B. K.

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VOL. XXXVII OTTAWA, ONT., SEPTEMBER, 1923 No. 6

THE BIRDS OF OTTAWA, 1923

Revised to March 20, 1923

By HOYES LLOYD

THERE have been three previous lists of the Birds of Ottawa. The first is entitled "List of Birds found in the vicinity of Ottawa City, specimens of which have been shot within the last few years." It is unsigned, but was written by the leaders of the Ornithological and Oological Branch of the Ottawa Field-Naturalists' Club for the year, Geo. R. White and W. L. Scott, (*O. F.-N. C. Trans.* Vol. 1, No. 3, 1881-2, pp. 29-34.) The next list, which will be found in *The Ottawa Naturalist*, V, 1891-92, pp. 31-47, entitled "The Birds of Ottawa" was compiled by the leaders of the Ornithological Branch of the club for the year, viz., A. G. Kingston, W. A. D. Lees, and Prof. J. Macoun. The third list was written by C. W. G. Eifrig. It is entitled "The Birds of Ottawa" and may be found in *The Ottawa Naturalist*, XXIV, 1910-11, pp. 152-163, 176-187, 198-206, 222-228.

Bird observations have been made and recorded at Ottawa for some forty-five years or more, and as there is every probability of continuous ornithological work here, it is thought to be important to revise the existing lists, to add any new observations available since the last published list and particularly to check as many of the early records as possible with the persons who made these records. The Ottawa Field-Naturalists' Club approved of the plan to prepare this revision.

The foundation has been the earlier lists and the records published in *The Ottawa Field-Naturalists' Club Transactions*, *The Ottawa Naturalist*, and *The Canadian Field-Naturalist*. The careful notes and the collections of G. R. and E. G. White have been available for my use at all times and practically every entry in this list has been discussed with them in detail.

The studious attention that the Whites have given to the ornithology of Ottawa, their recognition and preservation of rare specimens, and the long period covered by their observations, about 45 years in all, have been of inestimable value in furnishing the material upon which this list is largely based.

The national collection of birds in the Victoria Memorial Museum and the card indices have been at my service through the courtesy of the Director and the officers of the Biological Division. In addition to the Museum collection there are the White collection already mentioned, my own collection, and odd specimens. C. W. G. Eifrig has a collection which was not available. Manuscript notes have been arranged for me by W. E. Saunders, J. H. Fleming, P. A. Taverner, C. L. Patch, C. E. Johnson, and D. Blakely, and C. H. Young has given me the benefit of his observations here. To these and others my grateful acknowledgement is made.

The many short-comings of the list are all too apparent to me, but it is hoped that it will serve to direct attention again to the promising field for ornithological investigation in this fascinating and diverse locality.

The Ottawa District has been considered to comprise the area in Ontario and Quebec falling within a circle of thirty miles radius, the centre being the capital. It includes both Alleghanian and Canadian faunal zones.

Although many birds do follow the Ottawa River it does not appear to be a main highway of migration. On the other hand there is some evidence that the Rideau River is a fairly important North and South route.

The following description giving the topography of the district is quoted from *The Ottawa Naturalist* V, 1891-2, pp. 31-32, no important changes having occurred:

"The district covered by this list is embraced within a circle of thirty miles radius, with the City of Ottawa as its centre. It includes, roughly speaking, the Counties of Carleton and Russell, in Ontario, and the Southern portion of the County of Ottawa, in Quebec, and lies between 45° and 46° N. lat. The Northern portion of this district is covered by what may be termed the first range of the Laurentian Hills, one of which, known as King's Mountain, has an elevation of 1,125 feet above sea level, and rises about 900 feet above the large alluvial plain* lying between it and the Ottawa River. These hills are covered with a great variety of deciduous and evergreen trees, and among them are numerous mountain lakes,

*A portion of the Champlain lowland formed by deposition of clay and sand during Post-glacial Champlain marine submergence.—M. E. W.

varying in size from mere ponds to lakes of five miles and upwards in length. Flowing from the North through this range of hills, the rapid river Gatineau empties, opposite the city, into the Ottawa, which flows from the West across the centre of the district, widening above the City, with a Southward sweep into a broad and beautiful sheet of water known as Lake Des Chenes, and again narrowing at the City where, falling over a limestone ridge, it forms the well known Chaudiere Falls. Below these its course is straighter and narrower, and about twenty miles down it receives from the North the waters of another rapid stream, the Du Lievre. South of the Ottawa is a somewhat undulating tract of country, drained principally by the Rideau, which joins the Ottawa at the City. It is rather a sluggish stream in its upper reaches, through being dammed back at various points for canal purposes, and thus affords several excellent resorts for marsh birds. Much good farming land, with occasional hardwood ridges, is to be found in this part of the district, as well as swamps overgrown with tamarac, cedar, and other cone-bearing trees. The largest of these swamps is a peat-bog in Gloucester Township, known as the Mer Bleue, which covers several thousand acres of land, carpeted to a great depth with sphagnum moss, and produces immense quantities of berries of many kinds, notably cranberries and blueberries*. Thus it will be seen that the district in its various parts offers attractive breeding and feeding grounds for many diverse forms of bird life, and as there are parts of it as yet little explored by the ornithologist, it may still be looked to to yield new records, as well as much valuable information, of the breeding and other habits of many species of which too little is now known."

In numbering this check list species are numbered consecutively and where more than one subspecies is recorded under any species these sub-species are lettered. The "hypothetical" references are included in their proper sequence, but are so marked, and are not numbered. The nomenclature of the A.O.U. Check-List, 1910, with supplements, is followed.

BIRDS OF OTTAWA, 1923

Hypothetical

Podiceps cristatus (Latham). CRESTED GREBE.—Recorded in error[1] and removed from list[2].

Hypothetical

Æchmophorus occidentalis (Lawrence). WESTERN GREBE.—There is absolutely no evidence that this species has ever occurred here. G. R. White's record[3] of a pair shot at the mouth of the North Nation River was doubtless a mistake in identification, probably of *Colymbus holboelli*. This occurrence is also given by Macoun[4]. There are no local specimens in the White collection. Eifrig[5] records the capture of one alive on February 26, 1904. Charles McNab tells me that he kept this bird alive for about two weeks. E. G. White advises me that he and the late James Macoun saw it together while it was in his possession, identifying it unmistakeably as Holboell's Grebe.

1. *Colymbus holboelli* (Reinhardt). HOLBOELL'S GREBE.—Moderately common migrant spring and fall. One winter record, February 26, 1904, is that of the bird captured alive and reported by Eifrig[1] as Western Grebe, which see. Specimens have been taken as follows: October, 1881, male, Campbell's Bay, shot by W. F. Whitcher[2]; May 5, 1885, three taken by Mr. Munsey[3] (E. G. White and G. R. White); October 23, 1885, one shot by W. N. Rochester; May 21, 1885, G. R. White; October 31, 1903, E. G. White; November 25, 1908, two taken alive and kept on the market several days[4].

2. *Colymbus auritus* Linnæus. HORNED GREBE—Moderately common migrant spring and fall. It has been recorded as breeding[5], but aside from the summer specimen mentioned below, I do not know of any authority for this. Specimens have been taken as follows: May 5, 1885, six shot by Mr. Menzies, and on June 29, 1885, he shot a female which is now in the White collection; November 4, 1888, one shot on the Rideau was seen by E. G. White; October 31, 1903, E. G. White shot two at Lapointe's marsh.

3. *Podilymbus podiceps* (Linnæus). PIED-BILLED GREBE.—Moderately common summer resident, breeds. On August 15, 1885, Mr. Menzies shot a female and 2 very small young, all now in White collection. Specimen; September 10, 1895, Campbell's Bay, White collection. Noted as common at Shirley's Bay on October 2, 1903, E. G. White, and noted at the Petrie Islands, September 9-11, 1918, by Taverner and Patch.

4. *Gavia immer* (Brunnich). LOON.—Moderately common summer resident, occasional winter resident, breeds. Taverner and Blakely found adults with young on the Rideau River above Kemptville in June, 1918. A nest with eggs was found near Lac la Pêche (?), Quebec., in 1881[6]. There are few local specimens with data. Many brought to taxidermists formerly but species now protected. Eifrig's[7] notes give it as occurring from April till November. He also cites a winter occurrence, viz., December 18, 1905. E. G. White has seen it on two occasions in winter, and on February 16, 1922, I saw one flying over the city of Ottawa.

5. *Gavia stellata* (Pontoppidan). RED-THROATED LOON.—According to E. G. White and G. R. White this species is a regular but uncommon migrant. G. R. White's manuscript records give the following sight records, viz.: November, 27 1908, October 21, 1916, (2) at Rockland. The specimen taken by T. R. Coursolles[8] on November 12, 1885, is in the Victoria Memorial Museum. On December 10, 1917, a male was captured alive and brought to the late Dr. C. Gordon Hewitt by Edward Murphy. This specimen is now in the Museum.

*Conditions in the Mer Bleue have been much altered by drainage and the cutting of timber.

[1]*O. F.-N. C. Trans.* 3, p. 34.
[2]*O. N.*, V, p. 31.
[3]*O. F.-N. C. Trans.* 3, p. 34. *O. N.*, V. p. 33.
[4]*Cat .of Can. Birds*, 1909, p. 1.
[5]*O. N.*, XXIV, p. 155.

[1]*O. N.*, XXIV, p. 155.
[2]*O. N.*, V, p. 33.
[3]*O. F.-N. C. Trans.* 7, p. 358.
[4]*O. N.*, XXIV, p. 155-6.
[5]Eifrig, *O. N.*, XXIV, p. 156.
[6]*Rep of the Orn. Br., O. F.-N. C. Trans.* 3, p. 27.
[7]*O. N.*, XXIV, 1910-11, p. 156.
[8]*O. N.*, V, 1891-92, p. 33.

6. *Fratercula arctica arctica* (Linnæus). PUFFIN. —Accidental. One record[1], that of a young bird shot late in October, 1881. Fate of specimen unknown, but E. G. White remembers the occurrence and prepared the specimen, which was in the White collection for some time.

7. *Uria lomvia lomvia* (Linnæus). BRUNNICH'S MURRE.—Has been common here during its extraordinary migrations. Fleming[2] has discussed the general question of these and gives 38 references to articles written in this connection. Eifrig[3] gives an 1887 occurrence on the authority of G. R. White, but I think this is an error possibly for 1897.

1893-4. Flock of 20 seen by G. R. White November 19[4] and 5 taken[5], which were identified by Ridgway.

1894-5. G. R. White, as quoted by Fleming[2]: "They appeared in large numbers and continued to pass until the 21st of December."

1896-97. A general migration occurred this year, but I can find no Ottawa records.

1897-98. Large flocks flying up the Ottawa River and over the city on December 11, flight continuing till 13th reported by Fleming[2] on authority G. R. White. Eifrig[6] and W. T. Macoun[7] report the same flight. According to the latter, flocks of from 20 to 100 passed from 10 a.m. to 3 p.m. on December 12, 1897, and several were secured.

1901-2. G. R. White is quoted by Fleming[2] as reporting large flocks at Ottawa, November 13-15. A male in the Victoria Memorial Museum collection was taken December 13, 1901.

1903-4. G. R. White again reported a flight to Fleming as occurring—this time from November 15 to 21.

It is from this flight, doubtless, that the specimen in the Victoria Memorial Museum, dated March 23, 1903, was obtained.

1907-8. G. R. White tells me he shot a specimen on December 29, 1907. Eifrig[8] records them as arriving on November 25.

1908-9. Eifrig[9] records 6 seen on December 1, 1908, and elsewhere[10] records the first ones seen that year as 400-500 seen December 19th. G. R. White took one on November 25, 1908.

1909-10. G. R. White advises me that he took a specimen on December 11, 1909.

8. *Stercorarius parasiticus* (Linnæus). PARASITIC JAEGER.—Accidental, one record[11], a young bird shot September 4, 1909. Mr. Eifrig advises me by letter of March 7, 1922, "I still have the Parasitic Jaeger." It has been identified at the Field Museum[12].

9. *Larus hyperboreus* Gunnerus. GLAUCOUS GULL.—Probably regular migrant, chiefly in spring, rare. Eifrig[1] gives several plausible dates, all depending upon the observations of E. Bedard. E. G. White bought a freshly mounted specimen from E. Bedard which I have examined. E. G. White has noted this species as follows: May 27, 1915, (1); April 11, 1918, (1); May 12, 1918, (1); Spring, 1919, (1); April 17, 1921, (2); and G. R. White has noted it on April 20, 1912, (2); and April 10, 1921, (1).

10. *Larus marinus* Linnæus. GREAT BLACK-BACKED GULL.—Probably rare migrant. E. G. White remembers the one seen by G. R. White at kettle Island, May 2, 1885[2]. Eifrig records seeing one on April 9, 1906. There are no local specimens.

11. *Larus argentatus* Pontoppidan. HERRING GULL.—Common migrant; occurs in summer, but I know of no authentic breeding records. The nest[3] recorded as found near Wakefield was not satisfactorily identified. There is a female taken November 11, 1918, at Mooney's Bay in the Victoria Memorial Museum.

Hypothetical

Pagophila alba (Gunnerus). IVORY GULL.— C. H. Young desires me to correct an erroneous record for this species made on his observation and published in *O. N.*, XII, 1898-9, p. 69.

Hypothetical

Larus delawarensis Ord. RING-BILLED GULL.— There are no specimens from the Ottawa district in the local collections. Eifrig[4] records the capture of one alive and advises me that he saw the bird in captivity. Further observations will doubtless show that the species occurs and the single recorded occurrence may be corroborated.

Hypothetical

Larus atricilla Linnæus. LAUGHING GULL.— Recorded in error[5] and dropped from list[6].

Hypothetical

Larus franklini Richardson. FRANKLIN'S GULL. —In an old list[7] "*Larus Franklinii* Rich. Bonaparte's Gull" is given, doubtless an error which was corrected later[8] by substituting "*Larus Philadelphia*".

12. *Larus philadelphia* (Ord.). BONAPARTE'S GULL.—A tolerably common migrant spring and fall. I have seen local specimens which were taken June 9, 1885, and September 26, 1917. Taverner and Patch saw one at Rockland on September 8, 1918, and Patch and C. E. Johnson saw 11 at Gatineau Point, Quebec, on May 16, 1918.

13. *Sterna hirundo* Linnæus. COMMON TERN.— A fairly common migrant, probably more numerous in fall. I have seen a specimen taken June 9, 1885.

Hypothetical

Sterna paradisæa Brunnich. ARCTIC TERN.— The only record is that given by Eifrig[9] who advises me, "I had the Arctic Tern in hand." Nothing relating to the source, description, or disposal of the specimen has been published.

[1] *Rep. of Orn. & Ool. Branch, O. F.-N. C. Trans.* 4, 1882, p. 85.
Birds of Ott., O. N., V, 1891-92, p. 33.
Eifrig, *O. N.*, XXIV, 1910-11, p. 156.
Macoun, *Cat. of Can. Birds*, 1909, p. 15.
[2] *Proc. of the IVth Int. Ornith. Congress*, 1905, pp. 528-543.
[3] *O. N.*, XXIV, 1910-11, p. 156.
[4] *Rep. on Orn. 1893, O. N.*, VIII, 1894-95, p. 67.
[5] *O. N.*, VII, 1893-94, p. 164.
[6] *O. N.*, XXIV, 1910-11, p. 156.
[7] *O. N.*, XI, 1897-98, p. 205 & *O. N.*, XII, p. 16.
[8] *O. N.*, XXIV, 1910-11, p. 156.
[9] *O. N.*, XXII, 1908-9, p. 264.
[10] *O. N.*, XXIV, 1910-11, p. 156.
[11] Eifrig, *O. N.*, XXIV, 1910-11, p. 157, also *Auk*, XXVII, 1910, p. 204.
[12] *O. N.*, XXIV, 1910-11, p. 22.

[1] *O. N.*, XXIV, 1910-11, p. 157.
[2] Eifrig, *O. N.*, XXIV, 1910-11, p. 157.
R. of O. Br., O. F.-N. C. Trans: 7, p. 355.
O. N., V, 1891-92, p. 33.
[3] *Rep. of Orn. Br., 1881, O. F.-N. C. Trans.*, 3, 1882, p. 26.
[4] *O. N.*, XXIV, 1910-11, p. 157.
[5] *O. F.-N. C. Trans.* 3, 1882, p. 34.
[6] *O. N.*, V, 1891-92, p. 31.
[7] *O. F.-N. C. Trans.* 3, 1882, p. 34.
[8] *O. N.*, V, 1891-92, p. 31.
[9] *O. N.*, XXIV, 1910-11, p. 158.

14. *Chlidonias nigra surinamensis* (Gmelin). BLACK TERN.—Rare migrant spring and fall. E. G. White took six on the Rideau on May 28, 1888[1], some of which are still in his collection and one was presented to the Victoria Memorial Museum. On August 31, 1918, Patch and Taverner saw one at the Petrie Islands.

15. *Moris bassana* (Linnæus). GANNET.—Accidental, two (?) records. There is a young female in the Victoria Memorial Museum, taken at Shirley's Bay on October 13, 1909, by J. H. Slack[2]. E. G. White has seen two in Henry's taxidermy shop, one of which had been taken at Shirley's Bay, and may be the above, and one which was taken on the Gatineau River. Fleming's notes say "both birds were mounted by Henry" and so there are probably only two Ottawa records.

16. *Phalacrocorax auritus auritus* (Lesson). DOUBLE-CRESTED CORMORANT.—Fairly regular migrant, but scarce. One shot by C. G. Rogers, Shirley's Bay, about October 1, 1890[3]; one brought to Henry, October 17, 1904[4]; one shot by Gemmill, May 27, 1906[5]; one shot and given to G. R. White at Rockland, October 20, 1918; one seen October 31, 1920, by G. R. White; one shot October 15, 1921, by F. W. Bedard and now in the Victoria Memorial Museum; also observed by Patch and Johnson at Shirley's Bay on September 28, 1917.

17. *Pelecanus erythrorhynchos* Gmelin. WHITE PELICAN.—Accidental. One taken at Manotick by John Flann, Jr., on May 25, 1904, is now in the Victoria Memorial Museum[6].

18. *Mergus americanus* Cassin. MERGANSER.—Common migrant, some winter, and E. G. and G. R. White assure me that it breeds. There are specimens in the Victoria Memorial Museum as follows: Liévre River, Quebec, September 10, 1891, W. E. Saunders; Rideau River, March 26, 1897, C. H. Young; Galetta, Ontario, November 5, 1920, C. E. Johnson.

19. *Mergus serrator* Linnæus. RED-BREASTED MERGANSER.—Common migrant, and E. G. and G. R. White state that it breeds. There are specimens in the White collection: mounted bird taken November 11, 1889, by G. R. White.

20. *Lophodytes cucullatus* (Linnæus). HOODED MERGANSER.—Common summer resident and migrant; breeds (E. G. and G. R. White). There are specimens in the White collection and in the Museum. The mounted ♀ in the White collection was taken near Thurso, Quebec, November 18, 1889.

21. *Anas platyrhynchos* Linnæus. MALLARD.—Regular uncommon migrant. One in my collection was shot by G. R. White at Lochaber, Quebec, on November 20, 1922.

22. *Anas rubripes* Brewster. BLACK DUCK.—This is the commonest Duck of the Ottawa district. It breeds, Taverner having found young birds near Kemptville in July, 1918, and there is an old record of a nest with eggs having been found near Pêche, Quebec, on May 21, 1881[7]. The hybrid *Anas rubripes* X *anas platyrhynchos* has been taken quite frequently.

23. *Chaulelasmus streperus* (Linnæus). GADWALL.—Accidental. One was shot on the Ottawa from a flock of about 100 by Mr. W. F. Whitcher, in 1885. The specimen is in the White collection and is dated October 30th[1].

24. *Mareca americana* (Gmelin). BALDPATE. Said by E. G. and G. R. White to be a regular, but uncommon visitor during migrations. The mounted ♀ in the White collection was taken near Thurso, Quebec, on September 28, 1883. Recent dates reported by G. R. White are: October 22, 1921, and October 15, 1922.

25. *Nettion carolinense* (Gmelin). GREEN-WINGED TEAL.—Fairly common migrant. E. G. and G. R. White say that it breeds and that they have taken young birds on September 1st. Two were shot at Lochaber, Quebec, on November 17, 1922, by G. R. White, of which one is in his collection and one in mine.

26. *Querquedula discors* (Linnæus). BLUE-WINGED TEAL.—E. G. and G. R. White advise me that this is a common migrant and that it breeds. A mounted bird in the White collection was taken near Thurso, Quebec, on October 11, 1897, and a skin is that of a bird taken at Lochaber, Quebec, on September 3, 1922.

27. *Spatula clypeata* (Linnæus). SHOVELLER.—Uncommon migrant in fall. Specimens have been taken as follows: fall 1882[2], 2 shot by W. P. Lett in 1886[3], October 5, 1891 (White), October 23, 1891 (White), September 16, 1908[4], October 14, 1917 (White), September 21, 1919 (White), November 10, 1922, one ♀ shot at Lochaber, Quebec, by Creighton Nash.

28. *Dafila acuta tzitzihoa* (Linnæus). PINTAIL.—E. G. and G. R. White consider this a fairly common migrant. They mention spring flocks containing up to 100 birds. A specimen from one of these big flocks is dated May 2, '88, taken by S. A. K. White.

29. *Aix sponsa* (Linnæus). WOOD DUCK.—Formerly a common migrant and summer resident which has become comparatively rare of late. Fairly common during the fall of 1921, when some large flocks were seen. (E. G. and G. R. White). Two skins in the White collection are dated May 1 and 8, 1886; E. G. White.

30. *Marila americana* (Eyton). REDHEAD.—A regular fall migrant, shot every year (E. G. and G. R. White). Typical record; one specimen in my collection shot by E. G. White at Lochaber, Quebec, October 20, 1922.

31. *Marila valisineria* (Wilson). CANVAS-BACK.—Regular fall migrant, shot every year, probably more common than formerly. E. Bernard shot four at Rockland in one day, October, 1921. (E. G. and G. R. White).

32. *Marila marila* (Linnæus). SCAUP DUCK.—Common migrant (E. G. and G. R. White). A mounted bird in the White collection was taken by G. R. White at Lochaber, Quebec, on October 31, 1893.

[1]*O. N.*, II, 1888-89, p. 54.
also *O. N.* XXIV, 1910-11, p. 158.
[2]*O. N.*, XXIII, 1909-10, p. 192.
[3]*O. N.*, V, 1891-92, p. 77.
[4]*O. N.*, XXIV, 1910-11, p. 158.
[5]*loc. cit.*
[6]*O. N.*, XVIII, 1904, pp. 71-72.
[7]*O. F.-N. C. Trans.* 3, p. 27.

[1]*O. F.-N. C. Trans.* 7, p. 355.
O. N., V, p. 34.
O. N., XXIV, p. 159.
[2]*O. F.-N. C. Trans.* 4, p. 85.
[3]*O. N.*, I, pp. 98 and 102.
[4]*O. N.*, XXIV, p. 160.

33. *Marila affinis* (Eyton). LESSER SCAUP DUCK.—Common migrant (E. G. and G. R. White). D. Blakely took two at Galetta on November 3, 1920, which are in the Victoria Memorial Museum, and there are many recorded captures.[1]

34. *Marila collaris* (Donovan). RING-NECKED DUCK.—Common migrant (E. G. and G. R. White). During the fall of 1922 G. R. White's shooting partner secured three, each on a different day as follows: October 7, November 6, and 11. The mounted male in the White collection was shot at Lochaber, Quebec, on October 31, 1893, by G. R. White.

35. *Glaucionetta clangula americana* Bonaparte. GOLDEN-EYE.—An abundant migrant and moderately common winter resident. Breeding records are scarce. G. R. White tells me he found a female with 5 young at Kettle Island, on June 23, 1894. E. G. White took a female at Ottawa from which a fully developed egg was taken. R. E. De Lury found a female with four half-grown young on the Ottawa River above Cumberland, Ontario, July 22, 1922[2].

36. *Charitonetta albeola* (Linnæus). BUFFLE-HEAD.—Moderately common migrant (E. G. and G. R. White). A pair were shot by G. R. White on the Rideau River on April 23, 1886. The ♀ is mounted and the ♂ preserved as a skin in the White collection.

37. *Clangula hyemalis* (Linnæus). OLD-SQUAW.—A fairly common migrant (E. G. and G. R. White). A pair in the White collection were shot on the Rideau River on May 17, 1887, and were purchased by E. G. White.

Hypothetical

Somateria mollissima dresseri Sharpe. EIDER.—The single specimen recorded[3] has been carefully examined by me in the White collection and is *Somateria spectabilis* (Linnæus). The specimen said to have been taken on the Gatineau River is not extant and as all others have proved to be King Eiders, presumptively it was one too.

38. *Somateria spectabilis* (Linnæus). KING EIDER.—An irregular migrant, occurring at times in considerable numbers. There are several specimens in the White collection, all taken in 1908 during the flight recorded by Eifrig[4]. On November 15, 1920, Frank W. Bedard took two at Shirley's Bay, which he presented to the Victoria Memorial Museum.

39. *Oidemia americana* Swainson. SCOTER.—A regular migrant, occasionally occurring in numbers. On one day more than 40 were shot from a single flock of adult males (E. G. and G. R. White). One of the birds taken from this flock was purchased by the Whites and mounted for their collection. Their records give the date as October 13, 1908.

40. *Oidemia deglandi* Bonaparte. WHITE-WINGED SCOTER.—A common migrant (E. G. and G. R. White). The mounted ♀ in the White collection was taken at Lochaber, Quebec, by G. R. White on October 8, 1894. In *O. F.-N. C. Trans.*, 3, 1881-2, p. 33, is found: "*Oidemia fusca* Swain. VELVET SCOTER. C[ommon]." Cf. *Key to N. Am. Birds*, 3rd ed., No. 738.

The above are synonyms and the latter name should not be confused with *Oidemia fusca* (Linnæus), Velvet Scoter (of Europe).

41. *Oidemia perspicillata* (Linnæus). SURF SCOTER.—A common migrant (E. G. and G. R. White). The mounted pair in the White collection were shot on the Rideau Canal near St. Louis dam by Munzie on May 19, 1885.

42. *Erismatura jamaicensis* (Gmelin). RUDDY DUCK.—A rare and irregular fall migrant. On October 22, 1878, G. R. White shot one and on October 12, 1896, he shot four at Rockland. E. G. White saw one shot on October 28, 1906, and Eifrig records one taken October 15, 1907. There are early records of large numbers in 1882 and 1887.

43. *Chen hyperboreus hyperboreus* (Pallas). SNOW GOOSE.—Accidental. On October 11, 1886, G. R. White shot two females and one male at Lochaber, Labelle County, Quebec. These are the only local specimens, I believe, and they are all in the White collection at the present time. They were wrongly identified as Blue Geese (*Chen cærulescens*) and so recorded in the *Ottawa Naturalist*[1]. Later authors repeated the error[2]. E. G. White saw two old mounted birds, which appeared to be of this sub-species, said to have been shot some years ago at Carleton Place, Ontario. A Snow Goose was seen by E. G. White, Samuel Herring, and others near Ottawa on November 1, 1884[3].

(*Continued in October issue*)

[1] *O. N.*, XXIV, p. 161.
[2] *C. F.-N.*, XXXVI, p. 120.
[3] G. R. White, *Auk*, VII, 1890, p. 204.
O. N., IV, 1890-91, p. 65.
O. N., 1891-92, p. 35.
Eifrig, *O. N.*, XXIV, 1910-11, p. 161.
Correction made, *Auk*, XXXIX, 1922, p. 411.
[4] *O. N.*, XXIV, p. 161.

[1] *O. N.*, I, pp. 98 and 103.
[2] *O. N.*, V, p. 36.
O. N., XXIV, p. 162.
Macoun and Macoun, *Cat. of Can. Birds*, 1909, p. 122.
[3] *O. F.-N. C. Trans.* 6, p. 273 and *O. N.*, V, p. 35.

LIST OF ALBERTA HEPATICS

By A. H. BRINKMAN

SPECIES marked with a * are listed in J. Macoun's *Catalogue of Canadian Plants*, No. 7, or are in the National Herbarium, Ottawa, but have not been found by myself.

Species marked with an † have been found by myself and have so far not been recorded. Species not marked are listed in Macoun's *Catalogue* or are in the National Herbarium, Ottawa, and have also been found by myself.

Parts of records below were found on the boundary of British Columbia and Alberta, in such situations that it was not possible to say with certainty which province they were in; in all such cases the balance of probabilities has had to be used. In nearly all such cases, however, the

species has been clearly found in each province, and the few in which there remains a small element of doubt will be noted. But even in the few cases noted the habitats are similar on each side of the boundary, and it is a safe assumption that these species can be found on each side of the boundary, with the possible exception of *Sphenolobus minutus* var. *cuspidatus*, listed for British Columbia.*

†*Riccia Beyrichiana* Hampe
†*Ricciella crystallina* (L.) Warnst.
Sauteria alpina (Nees & Bisch.) Nees
Clevea hyalina (Sommerf.) Lindb.
†*Asterella Lindbergiana* (Corda) Lindb.
†*Bucegia romanica* Radian
Preissia quadrata (Scop.) Nees
Marchantia polymorpha L.
†*Riccardia latifrons* Lindb.
† " *major* (Nees) Lindb.
" *pinguis* (L.) S. F. Gray
Pallavicinia Flotowiana (Nees) Lindb.
†*Pellia Neesiana* (Gottsche) Limpr.
†*Gymnomitrium concinnatum* (Lightf.) Corda. Only found on boundary for Alberta.
†*Gymnomitrium varians* (Lindb.) Schffn.
**Marsupella emarginata* (Ehrh.) Dum.
† " *sparsifolia* (Lindb.) Dum.
†*Nardia Breidleri* (Limpr.) Lindb.
† " *Geoscyphus* (De Not). Lindb.
† " *hyalina* (Lyell) Carringt.
†*Arnellia fennica* (Gottsche) Lindb.
†*Jungermannia atrovirens* Dum.
† " *cordifolia* Hook.
† " *pumila* With.
† " *sphærocarpa* Hook.
† " *Schiffneri* (Loitles) Evans. One record only on boundary, in such a situation as to be doubtful as to whether British Columbia or Alberta.

†*Jungermannia riparia* Tayl.
**Jamesoniella autumnalis* (DC.) Steph.
†*Lophozia alpestris* (Schleich.) Evans
† " *badensis* (Gottsche) Schiffn.
* " *barbata* (Schreb.) Dum.
† " *Binsteadii* (Kaalass) Evans
† " *confertifolia* Schiffn.
† " *excisa* (Dicks.) Dum.
" *Floerkii* (Web. and Mohr.) Schiffn.
† " *grandiretis* (Lindb.) Schiffn.
† " *Hatcheri* (Evans) Steph.
" *heterocolpa* (Thed.) M. A. Howe
" *Hornschuchiana* (Nees) Schiffn.
" *incisa* (Schrad.) Dum.
" *inflata* (Huds.) M. A. Howe
† " *Kaurini* (Limpr.) Steph.
Lophozia Kunzeana (Hüben.) Evans
† " *longiflora* (Nees) Schiffn.
" *longidens* (Lindb.) Macoun
† " *Mülleri* (Nees) Dum.
" *lycopodioides* (Wallr.) Cogn.
† " *porphyroleuca* (Nees) Schiffn.
† " *quadrioloba* (Lindb.) Evans
† " *quinquedentata* (Huds.) Cogn. One record only on boundary.
Lophozia Rutheana (Limpr.) M. A. Howe
* " *ventricosa* (Dicks.) Dum.
†*Sphenolobus exsectæformis* (Breidl.) Steph.
† " *Michauxii* (Web.) Steph.
† " *minutus* (Crantz) Steph.
† " *politus* (Nees) Steph.
† " *scitulus* (Tayl.) Steph.
Plagiochila asplenioides (L.) Dum.
**Mylia Taylori* (Hook.) S. F. Gray
" *anomala* (Hook.) S. F. Gray
Lophocolea minor Nees
†*Chiloscyphus pallescens* (Ehrh.) Dum.
†*Harpanthus Flotowianus* Nees
†*Geocalyx graveolens* (Schrad.) Nees
†*Cephalozia bicuspidata* (L.) Dum.
† " *connivens* (Dicks.) Lindb.
" *media* Lindb.
" *pleniceps* (Aust.) Lindb.
† " " var. *macrantha* K. Müll.
**Cephaloziella Hampeana* (Nees) Schffn.
†*Hygrobiella laxifolia* (Hook.) Spruce
†*Calypogeia Neesiana* (Massal and Carest) K. Müll.
†*Calypogeia sphagnicola* (Arn. and Pers.) Warnst. and Loeske
**Calypogeia trichomanis* (L.) Corda
Lepidozia reptans (L.) Dum.
Blepharostoma trichophyllum (L.) Dum.
†*Anthelia Juratzkana* (Limpr.) Trevis.
Ptilidium ciliare (L.) Nees
† " *pulcherrimum* (Web.) Hampe
**Diplophylleia taxifolia* (Wahl.) Trevis.
Scapania curta (Mart.) Dum.
† " *cuspiduligera* (Nees) K. Müll.
" *irrigua* (Nees) Dum.
* " *nemorosa* (L.) Dum.
† " *subalpina* (Nees) Dum.
† " *paludosa* K. Müll.
†*Radula complanata* (L.) Dum.
**Porella rivularis* (Nees) Trevis.

This list, as to my part, was only made possible by the work, in naming and in various ways, of Dr. G. H. Conklin, Dr. A. W. Evans, and Miss C. C. Haynes, to whom my thanks are due.

I must thank Dr. M. O. Malte, too, for the list of Hepatics at the Ottawa Museum.

Other records for Alberta exist, and I should be glad to be put in touch with them.

*See *List of British Columbia Hepatics*, Brinkman, *The Canadian Field-Naturalist*, Vol. XXXVII, No. 5, p. 94.

A PRELIMINARY REPORT ON THE RELATION OF VARIOUS DUCKS AND GULLS TO THE PROPAGATION OF SOCK-EYE SALMON AT HENDERSON LAKE, VANCOUVER ISLAND, B.C.

By J. A. MUNRO

(*Concluded from No. 5, Vol. XXXVII, May, 1923*)

With the exception of the Gulls and Ducks, discussed later in this report, waterfowl were not abundant. A single Violet-green Cormorant was seen on two consecutive days; several Horned Grebes and Holboell's Grebes frequented the mouth of Clements Creek and an odd Pacific or Red-throated Loon was noted. Two Marbled Murrelets were seen half-way down the lake on November 10th but were not noted subsequently near the Hatchery. I was informed that one day in the latter part of October when the men were stripping sock-eye along the lake shore, standing knee-deep in the water, a flock of small birds alighted beside them and fearlessly began picking up the eggs which were lost during the process of stripping. Several swam within a few feet of the men and indeed were so tame that one was picked up from the water. From the description received these birds were identified as Northern Phalaropes.

SOCK-EYE SALMON. (*Oncorhynchus nerka.*)

In the spring and early summer sock-eye salmon are silvery on the sides and clear blue above, they are plump and well rounded, weighing from five to eight pounds. In the fall the glistening silver sides change to dull crimson and the head to bright olive; the scales disappear and the entire fish is covered with a slimy mucous. With the rapid growth of the reproductive organs in the late summer the male develops a hook nose and a slight hump on the back, while the body becomes depressed or slab-sided.

In Henderson Lake their yearly history is approximately as follows. The run of sock-eye in the Alberni Canal usually starts early in June but the first fish do not appear in the lake until July. At this time and for some weeks afterwards they are clean and silvery but apparently take no food after entering fresh water. The main run into the lake commences early in September, but as a rule spawning is not general until October and usually continues for two months or two months and a half. With the development of the reproductive organs the fishes pair off and travel to the spawning grounds along the north shore of the lake and in Clements Creek. The male excavates a "nest" in gravel where the water is shallow and in this the female deposits her eggs, the male always in close attendance. In this operation the female turns partly on her side and voids the egg or eggs with a quivering movement of the entire body. They are then fertilized by the male, the milt being voided in the same manner. Gravel or sand is usually swept into the nest by the movements of the fish when spawning and in this way the eggs are covered. The fish are spawned out in four or five days, thereafter rapidly lose what little vitality is left, and soon die. On a calm day at Henderson Lake during the spawning



No. 2—Glaucous-winged Gulls resting on beach in front of Hatchery

season the water's glassy surface is broken by hundreds of slowly-moving triangular objects; these are the dorsals of the dying fish. After a freshet in late November hundreds of dead sock-eye were washed down Clements Creek and accumulated on the gravelly shallows near the mouth. In several places fish were piled three deep over an area of approximately fifty square yards, and hundreds of carcasses floated amongst the debris of brush along the lake shore and drifted about in a big eddy near the creek's mouth, where came all the flotsam that drifted down stream.

It is understood that the only eggs which survive are those remaining buried in sand or gravel and these are relatively few in number owing to the numerous enemies preying on them and the enormous wastage due to overcrowding of spawning fish. Eggs hatch, as a rule, during February and March. When the fry first appear they are about three-quarters of an inch long and are attached to a large yolk-sac. Until this sac is absorbed the young fish remain hidden under stones or in the gravel. When the yolk-sac is absorbed the fry gradually work down stream into the lake, where, for a short period, they frequent the shallows along shore.

Later they move into deep water, coming to the surface for food only in the evenings. According to the Hatchery Superintendent fry remain a full year in the lake before going to sea and at their departure they average two and one half inches in length. In three years more the survivors return as adult fish, thus completing the four year cycle.

The spawning beds on Henderson Lake and Clements Creek are used chiefly by the sock-eye and it is this species only which is propagated at the Hatchery unless the run is so small that, in order to fill the baskets, it is necessary to take the eggs of less valuable species. Tyhee and Cohoe Salmon were spawning in the Henderson River on November 10th, but the first Cohoes were not seen at the head of the lake until November 16th. On this date a small school appeared at the mouth of Ternan Creek. These were readily distinguished from the sock-eye by their larger size and spotted backs. At no time were Cohoes abundant and the larger species, the Tyhee, was not recorded during my stay.

The 1922 run of sock-eye into Henderson Lake was phenomenally large and there was no difficulty in securing enough eggs to fill the Hatchery to capacity. Eight million, five hundred thousand eggs were taken, the product of two thousand, nine hundred and eight fish. These were fertilized with the milt from one thousand, six hundred and ten males. It might be noted that the run has increased considerably since 1919, when it was made illegal to fish within Uchucklesit Harbour.

THE HENDERSON LAKE SPAWNING GROUNDS.

This occupies a strip about twenty yards wide along the beach at the north end of the lake which is approximately half a mile wide; it also includes a shallow bay at the mouth of Clement's Creek. The bottom of the bay is of fine gravel and sand washed down by the Creek while the beach and the lake bottom are covered with water-worn stones and coarse gravel. The lake is shallow for ten to twenty feet from the shore and then deepens suddenly. There are a number of springs in the water and considerable seepage from the shore. The fore-shore, excepting that portion close to the hatchery, is fringed with willows and piled up with fallen timber and drift logs.

This spawning ground was used by large numbers of paired fish during my investigations (November 10th to December 8th, 1922). The area affected by the colder water of Ternan Creek attracted the largest number and hundreds must have spawned on the same ground. There was always a congestion at the mouth of this stream awaiting an opportunity, or perhaps the impulse, to ascend. In ascending they struggled half out of the water over the first shallow twenty yards to reach a comparatively deep pool where further progress was stopped by a weir.

Owing to the heavy rains the area of the spawning ground contracts and expands several times during the season. After a freshet hundreds of salmon can be seen spawning on what was dry ground shortly before. With the receding water many nests are exposed, but where there is sufficient seepage to prevent freezing the eggs therein retain their vitality. The wastage due to overcrowding is considerable. Early in December thousands of dead eggs were seen on the bottom in eighteen inches to three feet of water. These had accumulated for some time as they were in too great a depth of water to be reached by Gulls, and Ducks as a rule did not feed so close to the Hatchery.

THE CLEMENT'S CREEK SPAWNING GROUND

Owing to the exceptionally large run of sock-eye in 1922 it was not necessary to hold back the fish in the creek and the weir was opened early in October. During the time of my investigations fish were seen spawning in every suitable place for three and a half miles from the mouth—as far as I was able to go in one day. I was informed that they had been seen five miles from the mouth, which was the furthest upstream my informant had ever penetrated.

Early in November all the riffles were full of paired fish, holding themselves stationary in the

current with constant movement of their fins. In some of the quiet pools were schools of fish packed close together with their sides touching—these were new arrivals in the river that had not commenced spawning. Through the deep water they appeared uniformly black, the crimson on their sides being quite obliterated by the medium through which they were seen. Dead fish in various stages of decomposition were noted on November 11th and afforded evidence that spawning had been in progress for at least a month.

There were fewer fish above the weir than below and also fewer Ducks and Gulls, therefore my investigations on Clement's Creek were conducted chiefly below the weir.

GLAUCOUS-WINGED GULLS.

The number of Glaucous-winged Gulls (*Larus glaucescens*) frequenting Clement's Creek and the north end of Henderson Lake varied between eight hundred and fifteen hundred. These figures are based on careful daily estimates. Approximately sixty per cent were fully adult, that is, birds in the fourth winter plumage. The balance consisted of birds in all plumages, from individuals with juvenile wings and tail upward through all the successive stages. Sight observations were usually sufficient to identify birds of the year as such and fully adult birds were easily recognized. The former, accompanied by individuals which I took to be in their second year, were usually segregated and the greater proportion of these frequented the shores of Henderson Lake while the bulk of the individuals noted on Clements Creek were adults or third year birds, the latter only distinguishable under exceptionally favourable circumstances.

All left the creek and the lake shortly before dark to spend the night on salt water, but the roosting flight was not taken at the same time each night. If disturbed after four p.m. they generally flew straight to sea instead of alighting on the lake or flying up the creek as they did when alarmed earlier in the day. At 4.50 p.m. on November 16th they were seen leaving for the sea. There had been no shooting on this particular afternoon and possibly for this reason the exodus was later than usual. First, a fairly compact flock, numbering about four hundred, appeared coming from the direction of the creek; following these came smaller flocks, then small groups and single birds. Those that had been feeding along the lake shore took wing when the first flock from the creek was sighted and flew in the direction taken by these birds. Five minutes after the main flock had passed there was not a Gull in sight on the lake. The following evening the flight from the creek took thirty-five minutes —from 4.00 to 4.35 p.m.—to pass a given point, the birds travelling in bands of four to twenty. There was rarely more than half a minute between the passage of one band and that of the next and the length of time taken for the entire flight to pass would indicate that the last arrivals had been feeding several miles up the creek when the impulse to fly seaward possessed them.

Always the Gulls returned in the early morning before daylight and their noisy splashing in the shallows in front of the Hatchery and the clamour of their voices could be heard while it was yet too dark to see the birds. Apparently they arrived without food in stomach or gullet—evidence of sea food was found in only three of the specimens collected—yet they fed in the most desultory fashion upon the abundance which surrounded them. Some days they would rest for hours on the moss-covered cliffs that form the east shoreline of the lake within sight of the Hatchery, standing motionless on the numerous projections and ledges and whitening the cliff for a hundred feet or more above the water; seldom moving and generally quiet. Never were they seen gorging or showing marked excitement in feeding—both characteristic habits under other conditions. For example, at the Kildonan cannery, fourteen miles distant, when the herring barges are brought in Gulls of this same species can be seen gorging to such an extent that sometimes they have difficulty in rising above the box-like sides of the barges.

Neither adults nor younger birds showed much concern when one approached them in a boat. It was sometimes possible to come within twenty-five yards before they began to rise, the adults first, the youngest birds last. Usually they alighted again close by, perhaps on the same place if the boat continued moving. If shot at, however, they flew some distance, right out to sea if the day was well advanced. To approach them on foot was a difficult matter as they became alarmed immediately, particularly the birds which frequented Clements Creek, and it was necessary to stalk these carefully, taking advantage of every bush and tree trunk. Very often these stalks were unsuccessful; the birds, detecting some movement in the brush, would rise in a body and settle again at some distant point on the creek. Frequently when disturbed in this way they flew up the creek for several hundred yards, then turned and came down stream, flying only a short distance below the tree tops. When the flock was a large one, the narrow space between the wooded shores seemed to be full of the wheeling birds—a veritable snow storm—the adults shining snow white against the conifers and the few young birds black as Ravens in comparison.

The high gravel bar, mentioned before as dividing Clements Creek at its mouth, was a favorite resort. Frequently six or eight hundred birds asssembled there; always the majority were adult and invariably shy. If disturbed by a gunshot they flew half a mile or more down the lake and settled on the water.

The same individuals, recognized by peculiarities of plumage, appeared to frequent a particular feeding ground each day. One band numbering usually twenty, and all young birds, fed daily at the mouth of Ternan Creek in front of the Hatchery. These were quite tame and could be studied from the shore within fifteen yards and from a shorter distance by boat, unless the flock held strangers, when all became restless at too close an approach.

About the cannery at Kildonan there was always a large gathering of Gulls, probably a greater number than frequented Henderson Lake and Clements Creek. Possibly the majority of these birds, which fed on the refuse from the cannery and on the herring that were brought in almost daily at this season, did not come to fresh water to feed. I am inclined to believe that only certain individuals have the egg-eating habit. There was no way of proving this, but the fact that certain recognizable individuals returned day after day is evidence in support of this theory. Two Herring Gulls returned for six consecutive days to the same spawning ground on Clements Creek and each day they rested on the same gravel bar. Incidentally it might be mentioned that this species was common on Alberni Canal and rare on Henderson Lake.

The food taken by these Gulls while in the Henderson Lake district consisted exclusively of salmon spawn and the flesh of dead salmon. The former item was apparently the most desired but could be obtained in sufficient quantity for their needs only when the water was comparatively low. At such times they rarely touched salmon except to pick out the eyes. Low water conditions prevailed during the first five days of my investigations and during this period I examined hundreds of dead salmon, only a few of which had been eaten. In every case, however, the eyes had been taken and in some the gills. It would appear that the eyes are greatly prized, so much so that even living fish are attacked as they struggle, half out of the water, over an obstacle in the river bottom, or when they are stranded after a freshet in some shallow pool. Cases of Gulls attacking living salmon in this way were observed at different times by two of the Hatchery employees.

With a heavy rainfall Clements Creek rises rapidly and all the tributary streams, which normally are dry, become rushing torrents in a very short time. During these freshets the Gulls feed to a much greater extent on the dead fish, eggs being taken, however, when they can be reached. The spawning beds in the Creek during a freshet are covered with too great a depth of water travelling at too fast a pace for the Gulls to secure their fill of eggs. The water level in the creek drops almost as quickly as it rises and when it is sufficiently low the Gulls return to their favorite food. The first freshet occurred on November 15th and 16th, and with the rising water came a south-west wind and a slight surf on the beach. It was noted for the first time that the band of Gulls which frequented the beach in front of the Hatchery were eating salmon flesh. They were still fishing for salmon eggs in a method which will be described later, but obviously could not obtain sufficient under these conditions.

Both on the lake beach and in Clements Creek some birds were feeding at all times during the day, from early dawn to nearly dusk. Usually about fifteen per cent of a flock would feed while the balance stood about on the beach, or on the gravel bars and rocks in midstream if feeding in the Creek. The resting birds were invariably noisy and occasionally quarrelsome. Curiously enough silence generally prevailed when all were resting away from the feeding ground.

Portions of the spawning beds in the lake were covered at times by only six or eight inches of water and the backs and dorsals of the spawning fish were often above the surface. In such places the eggs were entirely at the mercy of these large Gulls. Repeatedly they stood right in the nests and burying their bills in the loose gravel picked out the eggs at will, or they swam about in the midst of the swirling fish, dipping for eggs until satisfied, when they would rest for a time on the beach.

When the Gulls are feeding in deeper water the method of securing eggs is to rise a few inches from the surface and to dive with wings partly closed. Although rising in the air to gain impetus, they are unable to submerge entirely, and, owing to their extreme buoyancy, they pop up again almost at once. On the deepest dives the ends of the primaries can be seen above the surface. This method of fishing was apparently quite effective, as it was practiced continually. Often forty or fifty were feeding at one time on the spawning beds in front of the Hatchery and the water seemed covered with fluttering Gulls. The rise from the water, the submersion and the recovery take about three seconds and the operation is repeated immediately; I was unable to see if more than one egg was secured at one time. Div-

ing from the swimming position is also practiced, but this does not admit of so deep a submersion and is less in use. On the Clements Creek spawning beds the eggs are taken almost entirely by diving, either from the surface of the water or from the air. In the current the birds are in constant motion, drifting down stream a few yards and flying back to their original position. Probably eighteen inches of water is the maximum depth at which the large Gulls can successfully fish for salmon eggs and the nests situated in deeper water are thought to be immune from the attacks of this species.

Dead salmon were stranded in large numbers along the shores of Clements Creek and the lake. Many carcasses lay some distance in the brush, carried thither during high water, and the gravel bars always held their quota; in fact it was hard to find a place free from the odour of decomposed fish. As previously stated, the Gulls turn their attention to this food when high water covers the spawning beds and at times a very thorough job is made of demolishing a large salmon; the skin is peeled off inside out from the head to the tail as the flesh is eaten, and nothing is left save the skull, the vertebræ and the long envelope of skin which usually remains intact and attached to the base of the tail. Frequently whole vertebrae and bones three inches or more in length are swallowed; these lie laterally in the stomach and later are voided in the shape of pellets.

Sometimes after feeding on salmon flesh in the creek bottom they rested in the trees high above the ground. Tall dead trees amongst the green timber were favorite roosts and their bare branches were often crowded with silent, motionless birds. Occasionally feeding birds were surprised in a small stream, an affluent of Clements Creek, which was entirely surrounded and in some places bridged over with willow brush and salal. Unable to rise straight up in the air, these birds were quite helpless in this brushy tangle and several times I could have caught one with my hands. When in this predicament they usually made two or three attempts to rise through the brush and finally scrambled up the little creek until a clearing was reached where they could take wing without difficulty.

During my investigations the contents from the gullets and stomachs of twenty-four Glaucous-winged Gulls were examined. The results of the analyses are shown in the accompanying table.

Sex:	*Date:*	*Hour*	*Locality:*	*Sock-eye eggs:*	*Remarks:*
Male	Nov. 11	3.30 p.m.	C.C.	6	Large quantity salmon flesh and bones.
Male	Nov. 14	11.30 a.m.	C.C.	50	Gravel.
Female	Nov. 18	10.30 a.m.	C.C.		A few salmon bones and gravel.
Male	Nov. 18	10.30 a.m.	C.C.		Stomach and gullet distended with salmon flesh.
Male	Nov. 22	9.45 a.m.	C.C.	3	Also 6 Cohoe eggs, small quantity salmon flesh, particles moss, hemlock leaves and portion hemlock cone.
Male	Nov. 22	9.45 a.m.	C.C.	45	
Male	Nov. 22	11.45 a.m.	H.L.		Empty.
Female	Nov. 22	11.45 a.m.	H.L.	68	
Male	Nov. 25	11.30 a.m.	M.C.		Salmon bones.
Male	Nov. 25	11.30 a.m.	M.C.	6	Salmon bones.
Female	Nov. 28	9.45 a.m.	C.C.	45	
Female	Nov. 28	4.00 p.m.	H.L.	125	Salmon bones.
Female	Nov. 28	4.00 p.m.	H.L.	6	
Female	Nov. 29	10.00 a.m.	M.C.	190	
Male	Dec. 1	9.00 a.m.	H.L.	1	Portion of salt water mussel.
Female	Dec. 1	9.30 a.m.	H.L.	18	
Female	Dec. 1	9.30 a.m.	H.L.	98	
Male	Dec. 1	10.00 a.m.	H.L.		Portion of shell of barnacle.
Female	Dec. 2	4.00 p.m.	H.L.	130	
Female	Dec. 2	4.00 p.m.	H.L.		4 oz. salmon flesh and bones.
Male	Dec. 3	3.30 p.m.	M.C.		1 Cohoe fingerling 80 mm. long, salmon bones.
Female	Dec. 3	3.30 p.m.	M.C.		Salmon bones.
Female	Dec. 6	11.45 a.m.	H.L.	4	Half of small marine mussel, portions of two others.

Explanation of abbreviations:—

H.L.—Henderson Lake.

C.C.—Clements Creek.

M.C.—Mouth of Clements Creek.

SHORT-BILLED GULLS. (*Larus brachyrhynchus.*)

Approximately one hundred individuals of this species frequented the district, associating chiefly with the young Glaucous-winged Gulls on Henderson Lake. With one exception all the birds noted were young of the year. They were much tamer than the larger species and those that daily visited the Hatchery paid but the slightest attention to a human observer.

Their feeding habits on the spawning beds were similar to those of the Glaucous-winged Gull but being equipped with relatively shorter legs they were prevented from obtaining food by wading except in very shallow water. When rising from the water to dive, and this was their chief method of feeding, they fluttered straight up in the air, made a quick turn when about three feet from the surface and plunged down with wings spread about one-third of their extent. They rise much higher in the air than the larger species and their actions are generally more graceful. In the

evening they accompanied the flight of Glaucous-winged Gulls to the salt water. Comparatively few fed in Clements Creek; obviously they were not heavy and strong enough to fish successfully in the rapid water.

Reference to the table showing the results obtained from the examination of nine stomachs and gullets of this species will show that salmon flesh is not represented in their diet. They were not seen feeding on salmon and this was to be expected, as the relatively weak feet and bills with which they are provided are not the proper equipment for the work of tearing a large fish apart. During the freshets it was possible to find enough eggs in the shallow water in front of the Hatchery for the satisfying of their appetites.

Sex:	*Date:*	*Hour:*	*Local-ity:*	*Sock-eye eggs:*	*Remarks:*
Male	Nov. 14	11.30 a.m.	C.C.	60	
Female	Nov. 17	11.00 a.m.	H.L.	15	Gravel and one Geometrid moth.
Male	Nov. 17	11.00 am.	H.L.		Empty.
Male	Nov. 17	11.00 a.m.	H.L.	10	Gravel.
Male	Nov. 17	11.00 a.m.	H.L.	39	Gravel.
Female	Nov. 18	4.30 p.m.	H.L.	18	1 sock-eye fry (on the previous day a few of these were liberated close to where this bird was shot.)
Male	Nov. 23	11.30 a.m.	H.L.	80	
Female	Nov. 23	11.30 a.m.	H.L.	87	
Male	Dec. 5	10.00 a.m.	H.L.		Empty.

MERGANSER. (*Mergus americanus.*)

Fifteen was the largest number of this species seen in one day. The various flocks observed were chiefly young of the year accompanied by one or more adult females; possibly the remnants of local broods. Only two adult males were seen and these were solitary birds. Eleven specimens were collected but there was no appreciable difference in the number of birds subsequently noted. Mr. Bothwell informed me that he had frequently seen at least fifty in the course of one day during the months of January and February, 1921. He also stated that the Merganser is the only species of Duck which breeds in the Henderson Lake region.

Early in the morning the Mergansers arrived from the south end of the lake or possibly from Uchucklesit Harbour. They fed entirely on salmon spawn and in Clements Creek only. Their daily routine, unless disturbed, was somewhat as follows: Arriving in the creek about dawn they immediately commenced feeding up stream and continued until satisfied—the appetite of a Merganser being enormous, satisfaction is not reached until the gullet is full to the mouth. For several hours afterwards they rested on the rocks or gravel bars, or perhaps idled in a quiet stretch of water. After the previous meal of eggs had been reduced to a mass of comminuted skins came another period of feeding and when their gullets were filled again, usually between four and five p.m., they departed for the salt water. Feeding or resting they were ever on the alert and had it not been for their habit of flying down stream when flushed it might have been a difficult matter to secure the specimens required.

Being able to swim under water, even in a moderately fast current, for at least ninety seconds, the Merganser would appear to be better equipped for salmon spawn fishing than the other species of birds which were studied. It is considered notable that no remains of young salmon or fish of any other species were found in the specimens examined and from this evidence one can gauge their partiality for spawn.

The following table shows the results of the examination of thirteen stomachs. All these specimens were obtained in Clements Creek.

Sex:	*Date:*	*Hour:*	*Sock-eye eggs:*	*Remarks:*
Male	Nov. 11	4.00 p.m.	450	Contents of gullet only. Comminuted egg skins in stomach not included.
Female	Nov. 11	4.00 p.m.	300	Same as above.
Female	Nov. 15	11.00 a.m.	700	" " "
Male	Nov. 15	11.00 a.m.	115	" " "
Female	Nov. 16	9.40 a.m.	50	" " "
Male	Nov. 16	9.15 a.m.	150	" " "
Male	Nov. 26	2.30 p.m.	560	Also 20 Cohoe eggs and approx. 100 sock-eye eggs in process of digestion. This bird was flying to sea from Clements Creek.
Female	Nov. 27	2.30 p.m.	420	Contents of gullet only. Comminuted egg skins in stomach not included. Shot flying to sea from Clements Creek.
Female	Dec. 2	3.00 p.m.	600	Also 2 Cohoe eggs. Shot just after she had finished feeding and was climbing on a rock to rest. Stomach contained mass of comminuted egg skins from last feeding. 12 sock-eye eggs were in the eyed stage.
Female	Dec. 3	11.00 a.m.	500	Estimated from skin fragments in stomach.
Female	Dec. 3	11.00 a.m.	50	Estimated from skin fragments in stomach—remains of last feeding. This bird and the last were swimming but had not begun to feed.
Male	Feb. 2, 1922		900	A smaller number in process of digestion.
Female	Jan. 29, 1922		700	A smaller number in process of digestion.

The only information obtained regarding the destruction of fry by this species was from two

stomachs and gullets preserved by Mr. Bothwell. These were shot at the mouth of Clements Creek on May 8th, 1921. The specimens were not sexed. The contents of the stomachs and gullets were identified as folllows:—

Merganser—May 8th, 1921—Gullet—1 fingerling (Cohoe) 140 mm.; 2 sock-eye fry 25 mm.
Stomach—bones and jaws of approximately ten small fish, presumbaly salmon.

Merganser—May 8th, 1921—Gullet—1 Cohoe fingerling 100 mm.
Stomach—bones and jaws of approximately 6 small fish, presumably salmon; comminuted matter and fine gravel.

MALLARD. (*Anas platyrhynchos.*)

From four to fifteen individuals were seen daily in Clements Creek between the lake and the weir. They fed by dipping in the shallower parts of the creek and also visited the pools in the back channels during the period following a freshet when such places contained spawning fish. Mr. Bothwell informed me that he had seen a Mallard drake *diving* for eggs in the centre of the stream. After feeding they rested on the stony margins of the creek, often under a timbered bank, which effectually concealed their presence. Most of the specimens obtained were shot as they jumped from these resting places. As Mallards were not observed flying down the lake in the evening it was assumed that the nights were spent on the creek.

The following table gives the results of the stomach analyses. All specimens were taken in Clements Creek.

Sex:	*Date:*	*Hour:*	*Sock-eye eggs:*	*Remarks:*
Male	Nov. 11	4.15 p.m.	41	Fragments of cedar leaves.
Male	Nov. 19	11.30 a.m.	450	Also 1 Cohoe egg—contents of gullet only. Comminuted egg skins in stomach not included.
Male	Nov. 25	3.00 p.m.	75	Sand and gravel.
Female	Nov. 25	3.10 p.m.		Fragments of small fish bones in process of digestion.
Male	Nov 28	3.30 p.m.	35	Sand.
Male	Nov. 28	3.30 p.m.		Salmon bones and gravel.

BARROW'S GOLDEN-EYE. (*Glaucionetta islandica.*)

This was the commonest Duck of the region and, like the majority of other species which were attracted to the lake by the spawning salmon, they spent the night on salt water. It was unusual to see many birds in the morning, as a rule they arrived between nine and eleven a.m. They associated in flocks of five to fifty and the number of birds present varied considerably from day to day. Ten was the smallest number noted in one day and one hundred and sixty (estimated) the largest. Stormy days usually brought a larger number, evidently to seek shelter from the rough water in Alberni Canal. Approximately ninety per cent were birds of the year, about equally divided as to sex; of the remainder eight per cent were adult females and two per cent adult males.

As far as I am aware this species does not breed on the coast region of the Province, certainly not on Henderson Lake, which is entirely unsuitable, offering neither nesting sites nor the animal food required for their young. It is thought highly probable that the birds which visit Henderson Lake in the winter are raised in Central British Columbia. There is an exodus of this species from the Okanagan valley early in September and it is believed this migration is westward to the coast.

The feeding ground principally used by the Golden-eyes comprised the bay at the mouth of Clements Creek, the Creek mouth itself and a blind channel to the westward. The blind channel and a considerable portion of the bay are shallow, the bottom consisting of fine sand and gravel while the creek bottom is stony. This whole area is a spawning ground for sock-eye and was always crowded with fish. It offered the strongest attraction to the Golden-eyes, for flocks would come back repeatedly after being shot at and settle in the bay. A careful survey of this feeding ground revealed no food save salmon eggs and a few caddis. It was fairly obvious therefore that the former were the attraction and this was verified by subsequent stomach analysis.

On their arrival they usually rested on the water for ten to twenty minutes before commencing to feed. It is believed that their first submersions were for the purpose of obtaining sand, as a quantity of the fine sand, characteristic of this particular portion of the lake, was found in most of the stomachs examined. Several birds which were shot shortly after they commenced diving had sand only in their stomachs. Food was obtained entirely by diving, the submersions lasting from fifty to seventy seconds. Excepting the usual short period of rest after arrival all their time in the bay was spent in feeding. They were exceedingly watchful and a boat putting out from the hatchery, a quarter of a mile distant, was the signal to depart for the open lake. Small bands or single birds would invariably circle before leaving and usually would come within gun-shot of an approaching boat. This trait, prompted by curiosity no doubt, was remarked so often that it

came to be relied on for the purpose of obtaining specimens.

The birds referred to in the following table were taken in the small area described above:—

Sex:	Date:	Hour:	Sock-eye eggs:	Remarks:
Male	Nov. 12	11.30 a.m.	50	Estimated from comminuted egg skins in stomach.
Female	Nov. 13	9.00 a.m.	65	40 of these were whole eggs in the gullet.
Female	Nov. 13	9.00 a.m.	55	35 of these were whole eggs in the gullet.
Male	Nov. 13	9.00 a.m.	160	110 of these were whole eggs in the gullet.
Male	Nov. 12	4.00 p.m.	300	220 of these were whole eggs in the gullet.
Male	Nov. 14	12.05 a.m.		Sand and gravel.
Female	Nov. 16	10.30 a.m.	86	26 of these were whole eggs in the gullet.
Female	Nov. 20	4.00 p.m.	20	Some algæ mixed with the sand and gravel in stomach.
Female	Nov. 21	3.00 p.m.	92	62 of these were whole eggs in gullet.
Male	Nov. 20	10.30 a.m.		Small quantity of comminuted matter.
Male	Nov. 20	10.45 a.m.		Same as above.
Male	Nov. 28	3.00 p.m.		Algæ and sand.
Male	Nov. 29	10.30 a.m.	12	
Female	Nov. 29	10.00 a.m.	15	
Male	Dec. 3	3.00 p.m.		Sand and comminuted matter.
Male	Dec. 4	8.30 a.m.	120	8 in eyed stage, 50% of balance in first stages decomposition.
Female	Dec. 4	8.30 a.m.	180	10 in eyed stage, 50% of balance in first stages decomposition.
Female	Dec. 4	8.30 a.m.	75	8 only recognized as infertile.
Female	Dec. 4	8.30 a.m.	70	10 only recognized as infertile.
Male	Dec. 6	11.15 a.m.		Sand and gravel.

GOLDEN-EYE. (*Glaucionetta clangula americana.*)

It was estimated that five per cent of the individuals in the flocks of Golden-eyes were of this species—only one adult male was seen and in the field the females and young of the year could not be distinguished from *islandica*. The habits of both species were identical.

Sex:	Date:	Hour:	Sock-eye eggs:	Remarks:
Male	Nov. 20	11.30 a.m.	8	
Male	Nov. 26	11.30 a.m.		Fragments of mussel shell. This bird had just flown in from the sea.
Male	Nov. 29	9.30 a.m.		Small quantity comminuted matter.
Female	Nov. 29	11.00 a.m.		Same as above.

BUFFLE-HEAD. (*Charitonetta albeola.*)

An adult male was collected on November 19th; this was the only Buffle-head observed. Its stomach and gullet contained 25 sock-eye eggs.

SURF SCOTER. (*Oidemia perspicillata.*)

The first Scoters, four adult drakes and one duck, were seen on November 24th. These fed just beyond the shallow water at the mouth of Clements Creek, diving usually together and remaining below the surface for ninety seconds, more or less. Very often they emerged simultaneously and swam close together to rest about three minutes before diving again. Two of the drakes were shot on the day of their arrival and the remainder were seen daily until the end of the month. On November 29th these were joined by five more adult drakes. The gullets of the two birds shot contained 275 and 175 sock-eye eggs respectively. In the stomachs were fragments of marine mussel shells. It is believed that these birds came straight from the salt water to the mouth of the creek as I watched them fly up the lake and pitch about a quarter mile from where I was concealed. They then swam leisurely in and did not commence feeding for at least half an hour. The two birds were shot after they had dived three times and the condition of the eggs in the gullets indicated their having been gathered in the three submersions. The birds were not feeding on the spawning ground but in the deep water and the eggs they were picking up had probably been carried down the creek during a freshet. All were in the first stages of decomposition.

BELTED KINGFISHER. (*Ceryle alcyon.*)

Kingfishers were seen occasionally at the mouth of Clements Creek and in the vicinity of the Hatchery, but were not common. A female was collected on November 15th and a male on November 19th. The stomachs of these specimens contained the remains of approximately 5 salmon fry and 12 salmon fry, respectively.

DIPPER. (*Cinclus mexicana unicolor.*)

Five Dippers were seen during the course of my investigations and two specimens were collected. The contents of their stomachs were analysed as follows:

Female: Ternan Creek, Nov. 12, 4 p.m. The remains of three caddis, several fragments of hemlock leaves and a small quantity of comminuted matter apparently caddis larvæ.

Male: Clements Creek Nov. 21, 11.00 a.m. 4 Sock-eye eggs.

Mr. Bothwell informed me that Dippers sometimes captured fry in the feeding tanks beside the Hatchery and also attacked those that were liberated in the lake. It may be stated that fry when first liberated remain in the shallow water close to shore where they are defenceless against the attacks of birds.

SUMMARY AND CONCLUSION.

It was found that four species of birds, viz: Merganser, Barrow's Golden-eye, Glaucous-winged Gull and Short-billed Gull were feeding in sufficient numbers on sock-eye spawn to cause damage to fishing interests.

Analysis of 13 Merganser gullets indicates that this species feeds exclusively on salmon-eggs in preference to fish, when the former are obtainable. It is believed that 900 sock-eye eggs constitute a full meal for a Merganser drake and 700 for a Merganser duck. There is no great distention in the gullets when containing approximately this number of eggs as is the case when large fish are swallowed. In all probability, however, they do not always procure two full meals a day, but it would seem safe to place the per diem consumption at 1000 for drakes and 800 for ducks. The period during which eggs are obtainable is approximately from October 1st to February 1st following, and, assuming that each Merganser obtains daily the above quota of eggs, we find that the season's consumption by a male and female Merganser may be 123,000 and 98,400 respectively. Assuming further that fifteen Mergansers, of which eight are males and seven females, feed daily in the creek during this period, the annual loss of eggs would total 1,672,800.

Barrow's Golden-eyes are present in much greater numbers, but the individual consumption of eggs is less, 300 being the largest number found in one bird. Like the Merganser, this species takes no other food while in the Henderson Lake region during the spawning season. In spite of the large number of birds present I think the annual loss of salmon eggs due to Golden-eyes is less than in the case of the Merganser. I have estimated the average daily consumption of eggs per bird at 100 and the average of birds present at 40. On this basis the seasonal consumption is 492,000.

During the actual spawning season, which continues approximately from October 1st to December 15th, two-thirds of the food of Glaucous-winged Gulls consists of salmon-flesh, the remaining third being salmon-eggs. This estimate is based on the food taken by the birds in the aggregate as it is believed certain individuals feed almost entirely on salmon flesh and others entirely or chiefly on eggs. After the spawning season is over it is probable that eggs form only a small portion of their diet. By that time most of the unburied eggs in the shallow water have been consumed and Gulls, unlike Ducks, are not able to fish for eggs in the deeper water. To arrive at an estimate of the number of eggs eaten by this species during the season I have computed the individual per diem consumption to be 50, the average number of birds feeding on eggs 1000 and the number of days when spawn is obtainable by this species to be 60, which gives a total of 3,000,000 destroyed during the season.

Short-billed Gulls apparently feed almost entirely on salmon eggs during the spawning season, as I found no trace of salmon-flesh in any of the stomachs examined. Gulls feed intermittently and it is difficult to arrive at even an approximate idea of the daily individual consumption of eggs. It could hardly be less than 100 however in the case of the Short-billed Gull and I have taken this figure as a basis of computation. Thus the seasonal destruction of eggs by this species, allowing a daily average of ninety birds feeding over a period of seventy-five days, is reckoned to be 675,000.

Based on the above estimates, which are extremely conservative, the number of sock-eye eggs consumed by Glaucous-winged Gulls, Short-billed Gulls, Barrow's Golden-eyes and Mergansers amounts to over five and three-quarter million during a season.

The effect on the propagation of salmon created by this destruction of eggs is not quite so serious as one might at first conclude from the above figures. For there is a natural wastage of eggs due to overcrowding on the spawning beds and a great many remain uncovered until they are killed by exposure to light. In Clements Creek thousands of eggs drift downstream and lodge in quiet water. No doubt some are covered with gravel but the majority of these drifting eggs die. It is believed that during the actual spawning season a large proportion of the spawn consumed by birds consists of these drifting eggs, the loss of which is assured in any case. Just what percentage of the whole consumption this proportion amounts to I was unable to determine by stomach analysis because it was impossible to distinguish fertile eggs from dead eggs when both were fresh, and partly decomposed eggs, which are easily recognized, were seldom found in the gullets. Fresh eggs, either fertile or infertile, are semi-transparent with clear oily contents and exactly the same shade of peach-red or strawberry pink*

Sock-eye eggs in the early stages of decomposition are orange-pink and opaque, the skin is tougher than is the case with fresh eggs and the contents are paste-like. This early condition of decomposition is easily recognized whether the eggs are seen through the water as they lie on the bottom of a stream or lake, or if taken from the gullets of birds. The bottom of Clements Creek, and portions of the lake bottom also, contained

*Colour Standard and Colour Nomenclature—Ridgway.

great quantities of eggs in this condition—they look exactly like coral beads—which apparently are not relished by birds for they were found in only six of the stomachs examined. It is quite possible, however, that decomposed eggs are eaten more extensively after the spawning season is over and the supply of drifting fresh eggs consumed. Fertile eggs which have reached the eyed stage can also be easily recognized, but it was too early in the season to find many in this condition.

Summarizing the above it may be said that a percentage of the eggs consumed by birds during the actual spawning season are infertile and their loss can have no effect on the propagation of salmon. Owing to the fact that these eggs are exposed and more easily obtainable it is believed that the percentage is a large one.

After spawning is over and the supply of drifting eggs has been consumed the amount of spawn taken by birds is less in quantity but probably the results are more serious. The spawning beds have been seeded for the last time, there is no more wastage through duplication of spawning, and if undisturbed a large percentage of the eggs buried in gravel will eventually hatch.

The relation of various species of birds to the salmon industry, particularly in connection with their consumption of spawn, offers a most complex problem in economic ornithology. In comparison problems arising from agricultural activities are easy of solution; the majority being due to a disturbance in nature's balance through increased production of grain, fruit, etc., which in turn fosters the increase of certain species of birds, an increase that may or may not be beneficial from an economic standpoint.

The fishing industry on the other hand is responsible for entirely different phenomena. In the case of salmon-fishing one of nature's self-propagating crops, through commercial exploitation, has been reduced to a point where its future as a business is threatened and any scheme that promises partial readjustment is welcomed in the hope of avoiding the obvious remedy, which is a closed season for fishing. In the disturbance of nature's balance brought about by commercial fishing no factors have been present to cause an increase in bird-life, no change has occurred in the habits of the species which feed on fish. In all probability various species of Ducks and Gulls, in much the same numbers as at present, have fed on salmon eggs for thousands of years. Whether the destruction of such birds on the salmon spawning ground would be beneficial or useless, as a means of increasing the supply of salmon, is an academic question—there can be no way of checking results.

In so far as the Henderson Lake area is concerned it might be pointed out that in 1922 the sock-eye run was much larger than in any preceding year to 1911 at least. The number of spawning fish was estimated by the Hatchery Superintendent to be 150,000 and as the spawning ground was overcrowded it is obvious that a greater number of fish could not seed the beds to better advantage. I should judge, therefore, that in spite of the admitted destruction of eggs by birds enough fry are hatched in that region to ensure at least a normal salmon run.

THE MOCKINGBIRD IN ONTARIO

By W. E. SAUNDERS

(Read before the McIlwraith Ornithological Club.)

THE list of supposedly southern birds that are found in Ontario more or less frequently and regularly is gradually growing with the more intensive study of this branch of natural science. There is, of course, a limit to the northern extension of every species, and the limit of to-day is a variable one in most cases. One needs to remember that, wherever his domicile, he is at the northern limit of some species, and at the southern limit of others. And these boundaries are subject to constant change. A few unfavorable seasons, whether of weather or of food, may make all the difference in the world to the most adventurous of some kind of bird.

The Mockingbird is the latest subject for thought along these lines, and the immediate occasion is the occurrence of one at London, where it lived during part of December, 1922, and January, 1923, until some disaster overtook it. The bird had adopted the grounds of Mr. Ed. McKone at the southern extremity of the city as its home, and there it found a cordial welcome, being handsomely treated by Mr. and Mrs. McKone, who took great pride in their rare guest, the first that has been recorded in the city. At first the bird was rather wild, but during the five or six weeks of its stay it became almost domestic, paying little attention to its human friends while it ate the food laid out for it. The original attraction was probably the abundance of berries on a native creeper, *Ampelopsis engelmanni*, which seem to be a strong drawing card for many native birds, a Flicker having stayed most of a recent winter feeding mainly on them. The Mocker found them very much to his taste, but after a time fed readily on bread crumbs, raisins

and other food from the house. No song was heard from him (her?) and a low scolding note, reminding one of that of the Catbird in character, was all that was noted in the way of vocal effort.

Early in January a shot was heard early in the morning and the Mocker was seen no more. The presumption is that some vandal, or rabbit hunter, seeing a strange bird while on his way with a gun, followed the human custom of killing it, to the great regret of London bird lovers, who were hoping for a possible nesting.

The Mocker has been noted rarely in Canada, instances coming to light only every year or two in the recent past, and much more rarely in more remote dates. The early books and lists mention it as a bird of excessively rare occurrence, and it is still so rare that there are very few people in Canada away from Point Pelee that have seen as many as two birds. On the Point, however, it is of regular occurrence, though still so rare that in my many visits I have yet to see my second one. Two specimens were shot there by the kind-hearted residents who knew my desire for rare specimens, but the little lecture that went with each note of thanks checked further killing and Mockingbirds are now greeted in other ways than by the shot-gun. The residents there are very appreciative of its musical efforts and there are two records of a male staying for months in the summer. The first occurrence in the London district was in January, 1922, at Coldstream, and the present instance bears out completely the Massachusetts experience that the bird is a wanderer in winter, rather than a migrant, and one is not therefore so surprised to learn that the summer residents do not seem to arrive at their breeding place on the Point until along in June. The only time when I have met this bird elsewhere in summer was on June 12, 1912, when I had made a trip to Belle River, on the south shore of Lake St. Clair, for the express purpose of hunting for the Yellow Rail, which summers in some of the low lands there, and I had started early in the morning to walk to Jeannette's Creek. But before I had gone two miles I was halted by a Mocker, in ecstatic song, in a thicket of thorns and other small growth. Immediately the thought of the Yellow Rails vanished and, as it turned out, gone was everything else but the chance to spend the morning with a Mockingbird in Canada. He imitated twenty birds by song and call-note and was undoubtedly nesting close by though I did not confirm this surmise.

In 1916 a Mockingbird lived in Jack Miner's woods near Kingsville, singing all spring, and undoubtedly nested.

In 1919, Bert Gardner, to whom the habitués of Point Pelee owe so many good bird records, reported a pair staying in his dooryard, the female sitting on her eggs less than a hundred yards away, between his house and his brother's. This nest was doubtless in Red Cedar, as there are very many suitable trees of that species there and not very much of other suitable growth. The male "Begins to sing at 3.30 in the morning" and Bert knows a good deal about what goes on in the early morning, like a true bird student.

P. A. Taverner, in the ornithological compendium, the "Pelee Book", records one visiting there on June 13, 1913, but it was seen on only that one day. Another was seen by the writer on May 19, 1918, in company with Bert Gardner. And one was shot by J. H. Fleming, the first record by the present company for the Point, on that memorable day that produced the only Canadian record for the Chuck-will's-widow, May 21, 1906.

The earliest date of capture is April 12, 1909, the specimen being in the writer's collection, and the latest on September 16, 1911, when one was seen by the late J. S. Wallace on the east beach.

The latest London visitor was seen by more bird lovers than any other Canadian individual, and the McIlwraith Club is to be congratulated that this bird selected London rather than Morpeth or some other distant place none too easy of access for his wintering.

RESOLUTION

Passed by the Council of The Ottawa Field-Naturalists' Club

WHEREAS many of our finest and most interesting birds that formerly bred in what are now settled localities are so seriously reduced in numbers as to be in danger of extermination and,

WHEREAS we are occasionally discovering stations still occupied by these birds in territories that are easily accessible to those who have not the welfare of these birds at heart. Therefore,

BE IT RESOLVED that the Ottawa Field-Naturalists' Club place itself on record as believing,

That whilst it is important that all such information should be brought to the attention of science, it is inexpedient to publish the same where it may become common property. They therefore

RECOMMEND that such information be filed only in the records of duly accredited and continuing institutions that have a serious interest in the study and preservation of wild life and where it may be available for qualified research students of approved discretion, for future generations or until the wider dissemination of the information can do no harm to the species concerned.

FURTHER, that all who discover such information are urged to transmit it to such institutions as are particularly interested and equipped for such confidential information and to no one else on whose discretion they cannot rely.

FURTHER that such institutions record the information so received in such manner that its confidential nature will not be violated, that it may be available at any time to those who have a legitimate interest in it, and that it may not be lost or forgotten through lack of present publication.

HOWEVER, BE IT UNDERSTOOD that nothing in these resolutions be deemed to prevent the information being given privately and under the seal of confidence to such students as have a legitimate interest in it and will not use it improperly or cause or permit others to do so.

NOTES AND OBSERVATIONS

SOME BIRD RECORDS FOR THE LAKE SUPERIOR REGION OF ONTARIO.—LECONTE'S SPARROW. *Passerherbulus lecontei.*—A juvenile female was taken on September 26, 1921, at Rossport, Ontario, and an adult female on the 29th. No others were seen. A young female was caught in a mousetrap on July 27, 1922, at Macdiarmid on Lake Nipigon. Except for a juvenile male taken on September 15, 1921, at Grand Marais, Minnesota, no other examples of this species were seen during the months of September in 1921 and July and August in 1922, which were spent on the north and west shores of Lake Superior.

HARRIS'S SPARROW. *Zonotrichia querula.*—The first specimen was seen at Rossport, Ontario, September 26, 1921. No more were observed until the 29th and 30th, when several were collected and others were seen mixed in flocks with Tree, White-crowned and White-throated Sparrows. Harris's Sparrows had been not uncommon with these Sparrows at Grand Marais, Minnesota, on September 19 and 20.

CLAY-COLORED SPARROW. *Spizella pallida.*—Clay-colored Sparrows were seen individually, but more frequently heard, at Port Arthur, Ontario, on July 20 and 21, 1922. On August 18-20 small flocks of adults and young were seen. Some were collected. The species appears to be rather common along the western shores of Lake Superior. Specimens were taken at Bayfield, Wisconsin, on July 13 and 14 and at Grand Marais, Minnesota, on July 18.—WALTER KAELZ.

ARCTIC FOX SHOT IN CAPE BRETON.—A white or Arctic Fox was shot at Lingan Bay on the east coast of Cape Breton Island on April 10th, 1923, by William Ferrow and Neil Boutelier, residents of that district.

There are no native white foxes in Cape Breton and it was undoubtedly a visitor from the far North.

In the Spring of 1922 there was a notable migration of white foxes from the north to the southern coast of Labrador, where they are supposed to have wrought much damage among the nests of the Eider and other sea fowl on the islands along the northern shore of the Gulf of St. Lawrence.

The winter just past (1923) will long be remembered for the severity of the weather and for the extent and thickness of the ice in the Gulf of St. Lawrence and adjoining waters.

It would appear that the fox, still responding to the urge of the migrating instinct, again this year continued on his southerly course and by a combination of drifting and running finally arrived on the Cape Breton coast.

The incident is interesting as showing how long the migrating idea keeps active and also as a demonstration of the ice conditions that made the journey possible.—J. L. DE VANY.

CONTENTS OF GREAT HORNED OWLS' STOMACHS.—The stomach of a Great Horned Owl shot at Mooney's Bay, Rideau River, Ontario, March 29, 1918, contained two field mice (*Microtus pennsylvanicus*), and one young and one full-grown house rat. Another collected five miles from Ottawa, May 8, 1922, when examined contained a mass of feet, flesh, bones and feathers of a Crow.—C. E. JOHNSON.

THE EATING OF BIRDS BY CHIPMUNKS.—An observer who lives at Kingsmere, Quebec, reported that on one day in July, 1923, three young House Wrens were observed to leave the nest between 7 and 9 a.m. At 7.30 a.m., on the same morning a Chipmunk was seen carrying one of these young birds. Within an hour another Chipmunk was seen with a young Wren and a short time later one with another Wren. It is possible that the same Chipmunk with the same Wren may have been seen twice, of course, but the net result seemed to be that six Wrens came out from this nest and only three have been seen about since. All of these may not have been destroyed by Chipmunks, but certainly some of them were.

On another occasion in the same place last year an observant boy of nine saw a Chipmunk at a Chipping Sparrow's nest. The Chipmunk had apparently bitten the head off two unfledged nestlings, while on the ground there was another beheaded nestling and one still alive. The nest in this instance was torn.—HOYES LLOYD.

OCCURRENCE OF *Synthliboramphus antiquus* IN THE PROVINCE OF QUEBEC.—Through the kindness of Mr. C. E. Dionne, Curator of the Museum of

Laval University, Quebec, a specimen of the Ancient Murrelet, *Synthliboramphus antiquus*, which is in the possession of that Museum, is here recorded. According to the label attached to the stand on which the bird is mounted, which is vouched for by Mr. Dionne, this Murrelet was taken at Montreal, Quebec, April 13, 1913, by Mr. Chase Casgrain. I have seen it on two or three different occasions since it came into the possession of the Museum.—HARRISON F. LEWIS.

BOOK REVIEW

AUTOBIOGRAPHY OF JOHN MACOUN, M.A., CANADIAN EXPLORER AND NATURALIST, ASSISTANT DIRECTOR AND NATURALIST TO THE GEOLOGICAL SURVEY OF CANADA, 1831-1920. A memorial volume published by the Ottawa Field-Naturalists' Club, 1922. Pp. 305 + VI, with eight plates.

The Ottawa Field-Naturalists' Club is to be congratulated on the appearance of this volume, a tribute to the memory of the late John Macoun, the distinguished and widely known Canadian explorer and naturalist. The Autobiography is a mirror reflecting a remarkable personality and every naturalist will look into it with both pleasure and profit.

John Macoun wrote his autobiography in the last years of his life and was still engaged upon it a few weeks before his death, but he was not able to bring it further than 1904. However, W. T. Macoun, in an *addendum* to the book, has given us a biography of his father from 1904 to 1920, thus allowing us to follow John Macoun's activities to the close of a long and useful life.

John Macoun was born in Ireland in the parish of Maralin, County Down, in 1831 and, as he lived until 1920, his autobiography serves to link the nineteenth and twentieth centuries. He tells us of his childhood days in Ireland and of his emigration to Canada in 1850. He and his brother went to Belleville, Ontario, and at first he "hired out" on a farm. He was, of course, a greenhorn at the work. One day he was asked to drive the oxen which were hitched to a "stone boat" used for drawing stones off the summer fallow. "In the evening," he says, "the men questioned me and asked me how I got along with the oxen and I said, 'Oh, very well. Haw gave me a great deal of trouble but Gee did whatever I wished him to.' Of course there was a great laugh. I found that the names of the oxen were Buck and Berry and that Haw and Gee meant for them to come toward you or go away from you, and as I had never heard the names of the oxen, but the other two words in constant use, I had decided that they were the names of the oxen."

John Macoun was a thorough Irishman: he both loved a fight and had a keen sense of humour. In writing of his schooldays he refers to the fights he had with his fellows and "other pleasant memories"! He says: "We thought it our duty to fight the members of their school every day. From what I can remember now I seemed to have been a terror, because I was left-handed and used my left hand while I was expected to use my right, and, looking back on it now, I always seem to have come out victor."

Macoun's sense of humour is well exhibited in the following: "About this time a sect of Methodists, called the Ranters, came to our village and preached in the village schoolhouse. They were troubled with idle men and boys. My mother was asked to allow the Ranters to preach in our kitchen on Sunday and she allowed them to do so. Later a prayer meeting was established there and it was one of the old-time meetings and the hearers would make responses when the speaker would bring out anything of an unusual or startling nature. One evening the speaker said, amongst other things, that if the people would not repent they would all be cast into Hell and tormented forever. One of the old men who frequently responded woke up as the preacher reached his climax and yelled at the top of his voice: 'God grant it!' To crown it all I laughed so heartily that I fell over and caused a great deal of disturbance, in the midst of which a canary, we had, started to sing."

John Macoun's principal exploratory journeys were the following: (1) an expedition from the east of Canada across the prairies through the Peace River area and over the mountains in winter to the Pacific coast, in connection with the search for a route for the Canadian Pacific Railway, and (2) an expedition with Selwyn in the reverse direction, namely, from the Pacific coast across the mountains in summer and then *via* the Peace River to Winnipeg. Subsequent explorations of the prairies in pre-railway days were undertaken by him in 1879, 1880, and 1881. In the east he made botanical journeys in western Ontario, the Gaspé Peninsula, Nova Scotia, and Anticosti. Moreover, from 1884 onward he collected extensively in British Columbia, including Vancouver Island. By means of all these travels, Macoun obtained a unique and very extensive knowledge of the plants of the Dominion, with the result that in the years 1884-87 he was able to publish his *Catalogue of Canadian Plants*, the first general Canadian flora.

In the winter of 1899-1900 Macoun began to write his *Catalogue of Canadian Birds* which was revised by him in 1907-08 and republished in 1909. In 1882 Macoun published a large and illustrated work called *Manitoba and the Great North West*, in which he gave a glowing account of the prairie lands and their possibilities. Referring to this book he says: "I included in it almost everything I knew and thought about the country."

John Macoun, in the course of his exploratory work, discovered many new species of animals and plants, most of which have been named by other scientists. At the end of the autobiography is a list of 48 species discovered by Macoun and given the specific name *Macounii* by their describers. The list includes 20 Flowering Plants, 14 Mosses, 2 Lichens, 6 Hepaticæ, 1 Starfish, 2 Mollusks, 1 Butterfly, and 2 Fish, and is a remarkable tribute to Macoun's activity as a collector.

A few errors have crept into the book. Thus the writer is informed by Mr. A. A. McCoubrey, who is familiar with the western mountains, that the illustration facing p. 230, which purports to show Mt. Macoun, is as a matter of fact a photograph of the Sir Donald Range which does not include Mt. Macoun, this peak being situated some distance south of the range represented. This mistake is unfortunate, since Mt. Macoun is a fine mountain, well worthy of commemorating by its name the work of the great Canadian naturalist. On p. 286 Lake *MacGregor* should be Lake *McArthur*. On p. 262 Macoun, writing concerning the year 1891, says: "We looked up at the place where Mr. Abbot was killed." Mr. Abbot was not killed until 1896. On p. 224 *Dr. Chedle* should be *Dr. Cheadle*. The lack of a map showing the routes of Macoun's chief journeys in the west is a serious omission which detracts from the value of the book.

Macoun's personality included an interesting variety of characteristics. He had an indomitable will, great powers of physical endurance, high courage and tenacity of purpose, all of which enabled him to overcome obstacles to his progress. He was a born naturalist with an intense love of plants and animals and with a collector's instinct. His wide knowledge of natural history, his excellent memory and his vivacity and humour made him an interesting conversationalist and companion; but, on the other hand, he was often dogmatic, and he was undeniably egotistic. He had, as everyone who reads his "Autobiography" must admit, a profound belief in himself; but, without this, he would scarcely have been able to accomplish what he did for Canada. His dogmatism and egotism are all the more easy to forgive and forget in view of his never-failing kindliness of spirit and helpfulness to all younger workers and those who sought his assistance. This spirit of universal kindness and helpfulness is acknowledged in an introduction to the "Autobiography" by Ernest Thompson Seton and is gratefully remembered by many others.—A. H. R. B.

THE "BRITISH BIRDS" MARKING SCHEME. Progress for 1922, by H. F. Witherby, *British Birds*, Vol. XVI, No. 10, March 1, 1923.

As indicated by the title, this is a report on the past year's work of marking birds under the auspices of "British Birds", one of the junior bird publications of England. Previous reports have been made annually since 1909. It is but a brief summary, merely enumerating the number of birds ringed, or as we are accustomed to say, "banded". No attempt is made here to report results farther than to count the recoveries. Evidently English ornithologists have gone into the work thoroughly and the amount that has been accomplished is illuminating to those who imagine that systematic bird marking is a particularly American field of investigation. Since the inauguration of the work in 1909 some 114,724 birds, of 106 species, have been banded. The total of recoveries is not given but there is an interesting table of 28 species giving total number ringed since 1909, number of recoveries so far and the percentage of recovery. In this the Mallard leads them all. Out of 686 ringed, 152 were recovered, a percentage of 22.1. This is a decidedly better record than that reported in the *Auk* for the banding of Ducks on Lake Scugog in 1920 and reviewed in these pages in the last March number, p. 57, where 16 per cent was the record. Cormorants, Herons, Sparrow Hawks and Woodcock follow with from 17 to 12 per cent. It is evident that birds that are commonly hunted for sport or as vermin make, in the number of returns, the most profitable banding subjects. On the other hand, the lowest percentage is obtained from the Spotted Flycatcher, 1.066 birds having been ringed with but 2 recoveries, a percentage of only .1.

As indication of individual activity it is interesting to note that Mr. Mayall ringed through the last year 1647 birds, though he visited no large bird colony where numbers could be ringed without much effort. Mention is made of the seventh record from South Africa of a Swallow with a *British Birds* ring, without, however, giving other data.

It is satisfactory to see that the Old Country is accomplishing so much good work in this interesting and incalculably valuable line of research.—P. A. T.

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VOL. XXXVII OTTAWA, ONT., OCTOBER, 1923 No. 7

A GROUP OF NEW SPECIES OF AGNOSTUS FROM LEVIS, QUEBEC

By THOMAS H. CLARK, Ph.D.

FROM the time when the genus Agnostus first received its name paleontologists have been striving to prove that name a misnomer, with, however, very little success. There are extremists who have been known to question whether Agnostus is even a trilobite, but such criticisms meet with almost universal disapproval. It is certain, however, that we know less, and desire to know more, about the family Agnostidæ than about any other family of trilobites. We are not yet harmoniously agreed upon a suitable classification, and what is worse, there are doubts abroad whether we know the head from the tail! Such grave matters as these concerning this intrinsically interesting group indicate the difficulties which must be faced by one who attempts to study it exhaustively. Happily, such a study is now being pursued in this country, and we may hope for a satisfactory solution of many of the problems in the near future. In the meantime any additional information concerning these trilobites should be made available at once; hence this paper.

Up to the present time five species have been listed from Lévis, three by Billings from the limestone conglomerates, and two by Dr. Raymond from the Shumardia limestone. The last two were identified as *A. sidenbladhi* and *A. orion* but they are now recognized as new and are described below. In addition to these the writer has four more species, all from the limestone conglomerates. This is not an appropriate time to discuss the classiffication of the Agnostidæ, nor has the writer anything to add on the subject, save for the new genus described below. The classification presented by Raymond in Eastman's Zittel (1913) is followed, and the orientation of the individuals is the one on which that classification is based.

TRILOBITA
ORDER HYPOPARIA BEECHER
FAMILY AGNOSTIDÆ M'COY
SUBFAMILY CONDYLOPYGINÆ RAYMOND

Peronopsis barrandei sp. nov.

PLATE I, figure 1.

A. orion Billings. Raymond, P.E., *Amer. Journ. Sci.*, ser. 4, vol. 38, p. 530, 1914.

Cephalon only known. This is small, 2.5 mm. in width and the same in length. The anterior margin is rounded, the sides slightly curved, and the posterior margin almost straight; the whole gives a subdued rectangular impression. Around the front of the glabella is a wide flat border.

The glabella is prominent, and divided into two lobes which are separated from each other and from the cheeks by deep sulci. The anterior lobe is somewhat shorter than the posterior, and both together extend for nearly two-thirds the length of the cephalon. The anterior lobe is somewhat wider than long, and rounded in front. The transglabellar furrow is convex anteriorly so that the anterior lobe has a re-entrant boundary. The posterior lobe is rather longer than wide, widest towards the front, narrowing somewhat posteriorly. It is very prominent, its convexity being indicated by the figure. Close to its anterior margin there is one small tubercle whose frontal slope is steeper than the rear one, so that it points forwards. The accessory lobes are small, and triangular in outline. The surface of the cephalon is free from pustules, but it is minutely wrinkled, especially upon its sides. Holotype, M.C.Z., 1694.

Horizon and locality. Shumardia limestone, Lévis formation, Beekmantown, from Lévis, Que.

This species most nearly resembles *A. fallax* Linnarsson (Middle Cambrian, Scandinavia), from which it may be distinguished by the simple form of its posterior glabellar lobes and by the position of the tubercle, which in *A. fallax* is approximately in the center of that lobe.

The genus Peronopsis, and indeed the subfamily Condylopyginæ, has previously been reported from the Cambrian alone. Its presence in the Lévis shales is its first recorded appearance in rocks of higher horizon.

Peronopsis marcoui sp. nov.

PLATE I, figure 2.

Agnostus sidenbladhi Linnarsson. Raymond, *Amer. Journ. Sci.*, ser. 4, vol. 38, p. 530, 1914.

This species is known from one cephalon only. This is subquadrate in outline, expanding towards the front. The anterior raised rim is prominent and wide. The fairly prominent glabella is separ-

ated from the rest of the cranidium by deep but not wide furrows which are not produced beyond its anterior end. In outline the glabella is pointed both anteriorly and posteriorly, and constricted in front of its middle. Its one furrow divides it at about one third its length from its anterior border. This furrow leaves the dorsal furrows somewhat ahead of the narrowest part of the glabella and is inclined forward so as to form an obtuse angle midway in its length. Within this angle on the posterior lobe is a median tubercle which points forward. The whole glabella rises from front to rear, so that its highest point is close to its posterior margin. The auxiliary lobes are incomplete, but probably large. The whole surface is minutely crenulated. Length of cephalon 4.25 mm., greatest width 4.5 mm., maximum elevation 1.5 mm. The type was collected by Dr. Raymond, and is in the collection of the Canadian Geological Survey.

Horizon and locality. Shumardia limestone, Lévis formation, Beekmantown, from Lévis, Que.

This species differs from the previous one in that its cephalon expands forward, and also in the unequal division of the glabella. The form of the glabella is also distinctive. It is a larger form, though with single specimens this is an uncertain criterion. It is not apparently closely related to any other American species but it might be confused with *Agnostus sidenbladhi* Linnrs. (Apatocephalus zone, Ceratopyge limestone, Scandinavia), or with *A. fallax* Linnrs. (Middle Cambrian, Scandinavia). From the former it differs slightly in the shape of the cephalon, which in *A. sidenbladhi* scarcely enlarges forward, and markedly in the transglabellar furrow, which in the last named species is concave forward; in that species, too, there is no glabellar constriction. *A. fallax* has much the same form as this new species, but it has a constriction in the posterior lobe of the glabella which is proportionally much longer than in our species, and the tubercle is placed about in the middle of this lobe. In *A. fallax* var. *ferox* the glabella is very much wider at its posterior end than elsewhere. Its posterior lobe is fully three times as long as the anterior, and the auxiliary lobes are very small. In the two species and the variety mentioned above the margin of the cephalon is narrow, but in *P. marcoui* it is very wide.

SUBFAMILY AGNOSTINAE JAEKEL

Agnostus americanus Billings.

PLATE I, figures 3, 6.

A. americanus Billings, *Pal. Foss. Canada*, pp. 395-6, 1865.

For purposes of comparison, and so that all of the species of Agnostids which occur at Lévis might appear on one plate, I have reproduced Billings' illustrations of the three species which he described from that place. Of the three *A. canadensis* and *A. americanus* have been found by the writer in Upper Cambrian limestone boulders at Lévis, but *A. orion* has not been positively identified. Figure 6 shows a large cephalon of *A. americanus* identical in almost every respect with Billings' type. The accessory lobes are larger than in Billings' specimen, they are actually larger than the drawing indicates, but that is the only real difference. Figure 6 (M.C.Z. Plesiotype 1695) is introduced for the sake of the profile sketch, which indicates the convexity of the cephalon better than a verbal description.

Agnostus innocens sp. nov.

PLATE I, figures 7, 7a.

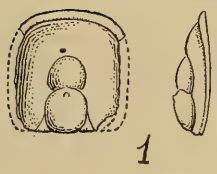
This name is proposed for a pygidium which occurs plentifully in a boulder at Lévis. This boulder, though small, yielded eight species of Upper Cambrian fossils; three of these are Agnostids and are described herein.

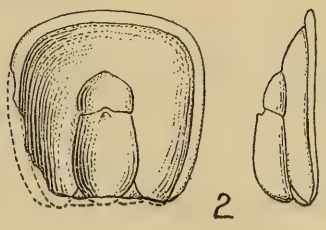
Pygidium small, subcircular in outline behind the nearly straight anterior margin. The axial lobe is prominent, two-thirds as long as the pygidium, twice as long as wide, contracted in the middle, expanding towards the anterior end, with two transaxial furrows. The posterior segment is widest just behind the furrow and narrows rather evenly backward; it is slightly more than half as long as the axial lobe itself. The median segment is short and is divided from the anterior one by a furrow which is convex forward. The latter segments bear a long tubercle which is traversed by the anterior transaxial furrow. The pleural lobes are evenly and gently convex, and there is a very narrow brim which is upturned in front. The posterior "corners" carry short sharp spines which point slightly outward. Dimensions, length 3 mm., width 3.5 mm. Holotype, M.C.Z. 1697.

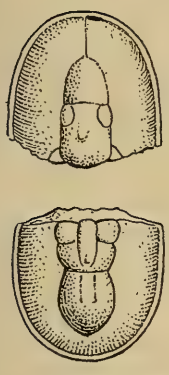
Horizon and locality. From an Upper Cambrian limestone boulder in the Lévis conglomerates, Lévis, Que.

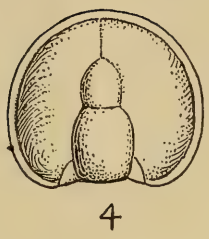
The cephalon which is associated with this pygidium is of the same size and shape. The glabella is divided into three subequal segments by two transglabellar furrows, the anterior one of which is concave forward, the central third of the other one is sharply curved forward to accomodate the prominent tubercle on the posterior segment. Accessory lobes are present. The dorsal furrows unite at an acute angle in front of the glabella, and from this junction a furrow runs forward to the brim. The latter is narrow. Dimensions, length 2.5 mm., width 2.7 mm. Paratype, M.C.Z. 1698.

The pygidium of this species resembles that of *A. americanus* Billings, but in that species the

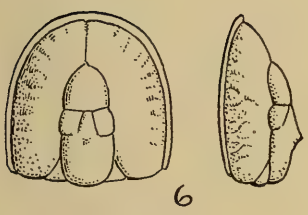


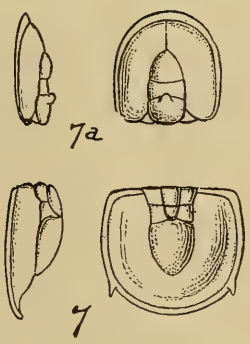


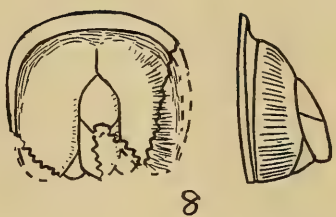


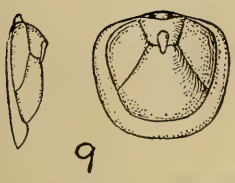












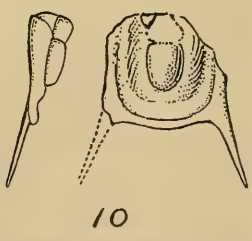


Figure 1.—*Peronopsis barrandei* Clark. Sketch of the type with profile view (restored). X4.

Figure 2.—*P. marcoui* Clark. Sketch of the type with profile view. X4.

Figure 3.—*Agnostus americanus* Billings. After Billings X 3.

Figure 4.—*A. orion* Billings. After Billings. X 4.

Figure 5.—*A. canadensis* Billings. After Billings. X 3.

Figure 6.—*A. americanus* Billings. Sketch of specimen collected by the writer, with profile view. X 4.

Figure 7.—*A. innocens* Clark. Sketch and profile view of the type. 7a, sketch and profile of cephalon associated with the type. Both X 4.

Figure 8.—*A. janei* Clark. Sketch and profile (restored) of the type. X 4.

Figure 9.—*Plethagnostus gyps* Clark. Sketch and profile view of the type. X 4.

Figure 10.—*Agnostus gladiator* Clark. Sketch and profile view (restored) of the type. X 4.

posterior segment is round with two longitudinal furrows, and the long tubercle on the anterior end of the axial lobe is not traversed by the furrow as in our species. The cephalon of Billings' species has but one glabellar furrow, ours has two.

Agnostus janei sp. nov.

PLATE I, figure 8.

Known only from one imperfect cephalon. This is of medium size, subquadrate, with the anterior corners broadly rounded. The genal angles not observed. The glabella is three-fifths the length of the cephalon, the dorsal furrows are wide and shallow, subparallel, but converge forward in the anterior fourth of their length. There is one transglabellar furrow, situated in front of the middle, convex forward. The glabella is slightly constricted at the ends of this furrow. The posterior lobe of the glabella is rather highly elevated and has a long low tubercle pointing forward close to the transglabellar furrow. The accessory lobes are large. The circumglabellar furrow is wide and shallow, as is also the median furrow in front of the glabella. The cephalon is surrounded by a nearly flat raised rim, inside of which is a low wide depression of about the same width, the two together being about as wide as the glabella. The lateral parts of the rim are depressed to a remarkable degree, the cephalon rising abruptly from those parts. The surface is minutely pustulose. Dimensions, length 3 mm., width 3 mm., elevation of posterior part of the glabella above the rim 1.75 mm. Holotype, M.C.Z. 1696.

Horizon and locality. From an Upper Cambrian boulder in the Lévis limestone conglomerates, Lévis, Que.

This species resembles *A. orion* Billings and *A. canadensis* Billings somewhat, but differs from them both in the flat rim and in the attendant wide depression. *A. orion* has no tubercle, and *A. canadensis* has small accessory lobes and a proportionately longer glabella which tapers forwards.

Agnostus gladiator sp. nov.

PLATE I, figure 10.

Known from one pygidium only, in form subquadrate. The axial lobe is prominent, twice as long as wide, rounded posteriorly, rising abruptly from the main part of the shield; it is so much damaged that no segmentation or ornamentation can be made out, although there is a trace of a median transaxial furrow. A convex border surrounds the posterior part of the shield, within this there is a wide and shallow depression.

The convex part of the pleural lobes is wide and highly elevated toward the front, and narrow and low around the posterior margin. There are two remarkably long spines springing from the posterio-lateral margins, directed slightly outward, and nearly as long as the pygidium itself. The shield is most highly elevated close to the anterior margin. Dimensions, length 2.8 mm., width, 3 mm., length of spines, 2.5 mm. Holotype, M.C.Z. 1699.

Horizon and locality. Associated with *A. americanus* and *A. innocens* in an Upper Cambrian boulder from the Lévis limestone conglomerates, Lévis, Que.

The presence of long spines serves to distinguish this species from most of the Agnostids. Other forms with which this one is associated have small, inconspicuous spines.

Plethagnostus gen. nov.

Axial lobe of pygidium transversely divided, the anterior part short, the posterior one expanding backwards with its lateral margins reaching the flat circumpygidial border. Genotype, *Plethagnostus gyps* sp. nov. This genus differs from Pseudagnostus in having the divergent dorsal furrows continued to the border of the pygidium. It is probably ancestral to Pseudagnostus.

Plethagnostus gyps sp. nov.

PLATE I, figure 9.

Known from one pygidium only; this is of medium size, nearly circular except for the anterior margin, slightly wider than long. The shield is moderately elevated, the highest point near the anterior end of the axial lobe. A wide, depressed, rounded brim surrounds the shield on three sides; within it there is a distinct groove separating the brim from the rest of the shield. The axial lobe is prominent and consists of two parts, the anterior one short and wide, contracting posteriorly, strongly elevated, with a median tubercle half as long as the lobe itself, bordered by deep dorsal furrows and a less deep transaxial furrow whose course is slightly concave forward and bears a median semicircular indentation, convex forward, to accomodate the tubercle. The posterior lobe is wide and enlarges backward; the dorsal furrows are much less distinct than in the anterior one. They reach the marginal groove, so that this lobe is completely surrounded by furrows. It is depressed convex, descending abruptly to the posterior margin. The intramarginal furrow in front of the axial lobe is modified so as to contain two deep pits, one each side of the center, with a sharp ridge between them. There were probably two backward pointing spines on the margin, but these have been broken off, leaving the merest traces of their positions. Dimensions, length 3.4

mm., width 3.6 mm., length of anterior lobe 1.8 mm., of posterior lobe .9 mm. Genoholotype, M.C.Z. 1700.

Horizon and locality. From an Upper Cambrian boulder collected by Jules Marcou from the limestone conglomerates at Lévis, Que.

THE BIRDS OF OTTAWA, 1923—Continued
Revised to March 20, 1923
By HOYES LLOYD

Hypothetical

Chen hyperboreus nivalis (J. R. Forster). GREATER SNOW GOOSE.—The Ornithological Branch of the Ottawa Field-Naturalists' Club[1] (1891) and Eifrig[2] (1910) record this sub-species on the basis of a specimen shot by Dr. Van Courtland in 1867. This specimen is given as *Chen hyperboreus* (Pall.) Boie, Snow Goose, in the report of the Ornithological Branch of the Ottawa Field-Naturalists' Club for 1884[3]. As the specimen had been destroyed by moths some time prior to this report, which is dated 14th January, 1885. I think there is no evidence of the sub-species having occurred here as designated in the 1891 and 1910 lists.

Hypothetical

Chen cærulescens (Linnæus). BLUE GOOSE.—Unknown from the Ottawa district. Specimens taken October 11, 1886, and recorded as this species are Lesser Snow Geese (see No. 43 this list.)

44. *Branta canadensis canadensis* (Linnæus). CANADA GOOSE.—Common migrant spring and fall. A flock of several hundred (1922) arrives at Britannia, Ontario, in March and appears to spend a month or six weeks in this vicinity. The birds rest on the ice in the centre of Lake Deschenes and fly inland to feed. All appear to be of large size.

45. *Branta bernicla glaucogastra* (Brehm). BRANT.—Accidental; one record, that of a bird shot by P. Thompson on the mud flats, one-half mile above Thurso, in the fall of 1887[4]. This record can be considered fairly well substantiated, although the fact remains that the bird was eaten and no portion of it preserved. A. W. Throop was with Thompson when the bird was shot and G. R. White has questioned Throop about the circumstances during 1922. The bird was identified from the plate in Audubon's *Birds of America*. It must certainly have been a bird of an unusual nature for this to have been done, for some little trouble would be incurred in consulting this work in the Parliamentary Library. It is also significant that Throop identified a mounted Brant in January, 1922, with the bird shot by Thompson in 1877. This occurrence is also corroborated by the fact that the species is a casual migrant through Ontario.

Hypothetical

Olor columbianus (Ord.) WHISTLING SWAN.—On November 5, 1911, E. G. White and A. W. Throop saw nineteen swans at Westmeath, Ontario (64 miles N.W. of Ottawa). They fed in the bay for an hour and remained in the vicinity for several days. Six were seen at the same place on the 18th of the month. E. G. White is familiar with the notes of both Canadian species of Swan and these birds were identified by their calls. Extra-limital.

46. *Botaurus lentiginosus* (Montagu). BITTERN.—Common summer resident, breeds. Nests have been found at Lake Flora swamp, Hull, Quebec, August 1, 1882, with half grown young[1]; and at Moore's Landing, June 25, 1898[2]. A. Wilson took 4 eggs at Patterson's Creek, now in Ottawa, May 25, 1900. Victoria Memorial Museum, No. 694.

47. *Ixobrychus exilis* (Gmelin). LEAST BITTERN.—A very rare summer resident. G. R. White shot one in his garden on May 27, 1882. S. A. K. White secured one at Lochaber, Quebec, on September 1, 1894. P. A. Taverner was shown the remains of a bird shot two miles below the mouth of the Liévre on September 8, 1918. D. Blakely found the species at the Hog's Back in September, 1917. It is believed that a pair bred at the Experimental Farm in 1898[3], and W. T. Macoun[4] records the finding of a nest with eggs there in the summer of 1902 by F. A. Saunders. Taverner found it in mid-June, 1918, at the mouth of Kemptville Creek on the Rideau.

48. *Ardea herodias herodias* (Linnæus). GREAT BLUE HERON.—Common summer resident, breeds. The big heronries so ably described by early Ottawa naturalists[5] have disappeared from the vicinity of the city.

49. *Butorides virescens virescens* (Linnæus). GREEN HERON.—A rare visitor, somewhat commoner in fall. Specimens have been taken as follows: W. E. Saunders, one on the Rideau; E. G. White, one, May 17, 1913; one was shot at Lochaber, Quebec, on September 7, 1918; and Taverner secured two at Kemptville Creek on July 15, 1918. One was seen in the White's garden on August 11, 1918, and one on August 13, 1918; while Taverner and Patch saw one at the Petrie Islands on September 9 and 10, 1918. Presumably this bird left then because of a frost. Taverner and Blakely took a nest with 5 eggs at Burritt's Rapids on the Rideau, on June 18, 1918, which is the only breeding record for the vicinity.

50. *Nycticorax nycticorax nævius* (Boddært). BLACK-CROWNED NIGHT HERON.—Common summer resident, breeds. The Whites tell me every marsh has its Night Herons. From E. G. White's manuscript notes I learn that one was shot by Robt. Lett on April 26, 1888, and in the same year it is written that five were seen at McLaren's Bay

[1] *O. N.*, V, p. 35.
[2] *O. N.*, XXIV, p. 162.
[3] *O. F.-N. C. Trans.* 6, p. 273.
[4] *O. N.*, V, p. 36.

[1] *O. F.-N. C. Trans.* 4, p. 83.
[2] *O. N.*, XII, p. 88.
[3] *O. N.*, XII, p. 87.
[4] *O. N.*, XVII, p. 25.
[5] *O. F.-N. C. Trans.* 4, p. 81. *Ibid*, 5, p. 141.

on August 8. In the 1891 list G. R. White is given as the authority for stating that young birds have been taken here in July, and this is supported by the fact that Taverner and Blakeley found the species at Kemptville Creek in mid-June and again in mid-July in 1918. There are two adult birds in the White collection, taken September 10, 1907. and Taverner and Patch took two juvenals at the Petrie Islands on August 30-31, 1918. They found it common there then. D. Blakely says that it visits Dow's Swamp in flocks in the fall.

51. *Rallus elegans* Audubon. KING RAIL.—Accidental, one record. One was shot at Billing's Bridge by May and identified by G. R. White. J. H. Fleming saw one in Henry's taxidermy shop, probably the same.

52. *Rallus virginianus* (Linnæus). VIRGINIA RAIL.—A fairly common summer resident, breeds. There are few local specimens, but D. Blakely tells me he has mounted one taken in Ottawa South. Eifrig[1] found it breeding at Osgoode, and there are juvenals in the White collection taken from a marsh on the Rideau River near their house. A. L. Garneau took a nest with 9 eggs near the city on May 20, 1896, Victoria Memorial Museum, No. 439. A late date is furnished by E. G. White who found two near Carp on October 15, 1903.

53. *Porzana carolina* (Linnæus). SORA.—A fairly common summer resident, breeds. There are young birds in the White collection and C. E. Johnson has observed adults with young in Dow's Swamp, June 26, 1920. A. L. Garneau collected a nest with 12 eggs near the corner of Bank Street and Third Avenue, on June 16, 1900. The adult was snared and identification is certain. Set No. 651, Victoria Memorial Museum. Other occurrences supported by specimens are: July 13, 1889[2], and May 20, 1921.

54. *Coturnicops noveboracensis* (Gmelin). YELLOW RAIL.—Rare fall migrant. Known only from the observations of G. R. White. He secured specimens at Rockland on October 22, 1895 (1), and on October 20, 1909 (1). He reports seeing the species as follows, during 1920 at the same place: September 1, (2); September 6 (1); October 10, (1); and in 1922 he reports seeing one at Lochaber, Quebec (same vicinity) on October 8. Probably commoner than these records indicate. Cf. *O. N.*, X, 1896-7, p. 72; *Auk*, XIII, 1896, p. 173; *O. N.*, XXIV, 1910-11, p. 176.

Hypothetical.

Creciscus jamaicensis (Gmelin). BLACK RAIL.—This species has been recorded in error[3] and the error corrected[4].

55. *Gallinula galeata* (Lichtenstein). FLORIDA GALLINULE.—Fairly common summer resident, breeds. The Whites say that it has been shot generally throughout the Ottawa district. It is given in *O. F.-N. C. Trans.* 4, p. 85 as common. W. E. Saunders has recorded the taking of a nest with seven partly incubated eggs at Kars on July 9, 1890[5]. Taverner found the species nesting at the mouth of Kemptville Creek in 1918; the nest contained one young bird and three hatching eggs in the middle of June.

[1] *O. N.*, XXIV, p. 176.
[2] *O. N.*, V, p. 36.
[3] *O. F.-N. C. Trans.* 3, 1881-82, p. 33.
[4] *O. F.-N. C. Trans.* 4, 1882-83, p. 86.
[5] *O. N.*, V, 1891-92, p. 36. also *Ibid*, p. 79.

56. *Fulica americana* Gmelin. COOT.—Common summer resident, breeds (E. G. and G. R. White). Specimen in White collection dated September 28, 1893. G. R. White found nests at Lochaber Bay. C. E. Johnson and C. L. Patch observed one at Gatineau Point on May 16, 1918.

57. *Phalaropus fulicarius* (Linnæus). RED PHALAROPE.—Rare migrant in fall. The two occurrences given in *O. N.*, V, p. 37, have been checked with the White's manuscript notes. These are: one shot by E. G. White on October 21, 1886. and one by G. R. White on September 1, 1888. The latter is in the White collection now. In addition to these the Whites tell me they have taken single birds as follows: September 1, 1885; and September 22, 1897, as well as one taken October 31 (year?).

58. *Lobipes lobatus* (Linnæus). NORTHERN PHALAROPE.—Accidental; four specimens. There are two specimens in the White collection, one taken by E. G. White and one by G. R. White on the same day, September 22, 1897. Both are correctly identified[1]. Another was obtained on September 10, 1890, by A. G. Kingston; it had just been shot near Burritt's Rapids[2] and G. R. White informs me that he shot one at Kettle Island on October 12, 1901.

Hypothetical.

Steganopus tricolor Vieillot. WILSON'S PHALAROPE.—G. R. White believes that he secured one here many years ago which was sent to a taxidermist in Montreal and lost. It was on the authority of this specimen that the species was once placed on the Ottawa list[3], but it was removed later[4].

59. *Rubicola minor* (Gmelin). WOODCOCK.—Common summer resident, breeds. Flights of some magnitude occur in October and provide good sport for the hunter who is so fortunate as to fall in with one. In 1888 a pair nested in the White's garden; the Woodcock shooting was good there for a time that fall. I have a fully grown young bird picked up dead at the Rockcliffe Rifle Ranges on June 16, 1920. This indicates the early nesting of the species.

60. *Gallinago delicata* (Ord.) WILSON'S SNIPE.—An abundant migrant and common summer resident, breeds. A good bag could be obtained within easy walking distance of the city in October, 1921. On August 29, 1918, Taverner flushed more than fifty at the Petrie Islands. Some of the old lists give this as a breedng species but omit the details. F. Napier Smith found a nest with four eggs near Lochaber, Quebec, on May 24, 1915[5], and C. H. Young tells me that he found a nest, containing 4 eggs, in a wet field near Hurdman's Bridge on May 26, 1897. There is a juvenal from this nest, taken June 2, 1897, in the Museum collection.

61. *Limnodromus griseus griseus* (Gmelin). DOWITCHER.—Accidental, three specimens in the spring of 1890. One of these was taken here May 9th, by G. R. White, and two were shot on May 22nd by E. G. White. One specimen is in the White collection and is referred to this subspecies. Cf. *O. N.*, V, 1890-1, p. 37; *Auk*, VII, 1890, p. 400; and *O. N.*, XXIV, 1910-11, p. 177.

[1] *O. N.*, XI, p. 207.
[2] *O. N.*, V, p. 37 and p. 77.
[3] *O. F.-N. C. Trans.* 3, 1881-82, p. 32.
[4] *O. N.*, V, 1891-92, p. 31.
[5] *C. F.-N.*, XXXVI, p. 70.

62. *Calidris canutus* Linnæus. KNOT.—Exceedingly rare migrant. E. G. White shot at least six on June 4, 1890, of which three are still in his collection and some in the Museum collection. This occurrence is mentioned in the 1891 and 1910 lists. N. H. Lett has one in his collection which was shot here by W. P. Lett. Undoubtedly this is the specimen upon which the occurrence of the species as given in *O. F.-N. C. Trans.* 4, p. 85, is based, although the statement there is a general one and the specimen itself is not mentioned.

63. *Arquatella maritima maritima* (Brunnich). PURPLE SANDPIPER.—Accidental, one record. The specimen shot by W. Forbes on the Rideau River, October 29, 1885[1], is in the White collection, where I have examined it. This is the only specimen and has been referred to in several lists.

64. *Pisobia maculata* (Vieillot). PECTORAL SANDPIPER.—Common migrant; there are specimens in the White collection.

65. *Pisobia fuscicollis* (Vieillot). WHITE-RUMPED SANDPIPER.—Uncommon migrant in fall. A considerable number of captures are noted in the 1891 list and in Eifrig's list. More recently G. R. White shot one on November 4, 1911, Philip Foran another on October 8, 1921, and I found three at Britannia, Ontario, on November 1, 1922, of which one was secured.

66. *Pisobia bairdi* (Coues). BAIRD'S SANDPIPER.—Accidental, one record, that of a specimen taken by G. R. White on September 11, 1894, and now in his collection. I think intensive study of the migrants in this vicinity might disclose this as a commoner species than this indicates.

67. *Pisobia minutilla* (Vieillot). LEAST SANDPIPER.—A moderately common migrant spring and fall. There are specimens in local collections.

68. *Pelidna alpina sakhalina* (Vieillot). RED-BACKED SANDPIPER.—The Whites consider this to be a rare migrant, and certainly there are few local specimens. W. E. Saunders writes me that as this species is common in Ontario during migrations he would expect it to occur in fair numbers in Ottawa in fall. However, the Ottawa is far from being a main artery of migration, and shore-birds seem scarce in situations apparently eminently suited to their needs. It is significant that the Whites say there has been a decrease in shore-birds along the Ottawa.

69. *Ereunetes pusillus* (Linnæus). SEMIPALMATED SANDPIPER.—A moderately common migrant spring and fall. Specimens in local collections.

70. *Crocethia alba* (Pallas). SANDERLING.—A moderately common migrant. I have seen fall specimens only.

71. *Limosa fedoa* (Linnæus). MARBLED GODWIT.—Accidental, one record. G. R. White did not secure this specimen as reported in Eifrig's list, but saw it in the taxidermist's. It was a wounded bird and was captured alive at Britannia about June 4, 1902.

72. *Limosa hæmastica* (Linnæus). HUDSONIAN GODWIT.—Probably a regular migrant in fall fifty years ago. More recently very rare. G. R. White's notes show that he has taken specimens as follows: September 21, 1874 (2); October 16, 1876 (2); October 17, 1876 (1); October 11, 1897 (1); a male changing to winter plumage, October 20, 1900; the last one taken here. The 1897 specimen is in the White collection as well as one other.

This species has not disappeared yet. I am practically certain that one was taken on the Bay of Quinte in the fall of 1921.

73. *Totanus melanoleucus* (Gmelin). GREATER YELLOW-LEGS.—A common migrant of which numerous specimens have been taken. Taverner and Patch found it common at the Petrie Islands at the end of August, 1918, and secured examples.

74. *Totanus flavipes* (Gmelin). YELLOW-LEGS.—A common migrant, specimens in local collections. Taverner and Patch found about fifty at one spot on the Ottawa at the end of August, 1918.

75. *Tringa solitaria solitaria* (Wilson). SOLITARY SANDPIPER.—Common migrant; specimens in White collection and in Museum.

E. G. White saw 2 adults with young two-thirds grown at Wilson's Pond, South March, Ontario, July, 1905. Cf. *Auk*, XXIII, 1906, p. 316.

76. *Tryngites subruficollis* (Vieillot). BUFF-BREASTED SANDPIPER.—Accidental. On August 24, 1886, E. G. White shot eight at Duck Island. One of this lot is in the White collection. Cf. *O. N.*, I, pp. 98 and 102, also 1891 list and Eifrig's list.

77. *Bartramia longicauda* (Bechstein). UPLAND PLOVER.—E. G. White saw two of these birds near Bourget, Ontario, on May 31, 1922, and again on August 6 he saw two at the same place. This is the first occasion on which the species has been reported from the Ottawa district. It is reasonable to infer from the above dates that the birds may have bred.

78. *Actitis macularia* (Linnæus). SPOTTED SANDPIPER.—An abundant summer resident, breeds. Victoria Memorial Museum, No. 1183, June 5, 1916, C. L. Patch.

79. *Numenius hudsonius* Latham. HUDSONIAN CURLEW.—Probably an uncommon but more or less regular migrant in fall 35 years ago, now exceedingly rare. Not mentioned in previous lists of the district, having been overlooked. G. R. White tells me that he used to find them where Strathcona Park is now located, and that they usually associated with the Golden Plover. He has taken in all about half a dozen specimens, three of which where during the great flight of Golden Plover in 1885. About the same time he saw T. G. Coursolles with two. There is a mounted bird in the White collection taken at Strathcona Park, now in the city, in 1887.

The only recent occurrence of which I am aware was in 1912, when A. Workman shot a male near the city, and this specimen was presented to the Museum.

80. *Squatarola squatarola cynosuræ* (Linnæus). BLACK-BELLIED PLOVER.—A moderately common fall migrant. There are October specimens in the White collection and most local occurrences seem to be in that month; however C. E. Johnson saw four at Galetta on November 4, 1920.

(*Continued in November issue*)

[1] *O. F.-N. C. Trans.* 7, p. 355.

SOME PHASES OF INSECT PARASITISM*

By W. R. WALTON

INSECTS, beyond doubt, are the most numerous of all visible creatures. Their number on the earth is almost beyond computation, and in spite of their comparatively small size and apparent individual weakness, they succeed in forcing themselves into practically every phase of man's existence. They devour his growing crops, pillage his stored provisions, riddle his household goods and his raiment, worry and even slay his domestic animals, and, sad to say, not content with this havoc, they invade his very person, often infecting him with loathsome and sometimes fatal disease. The deplorable death of Lord Carnarvon a few days since is an instance of the latter character.

As pointed out by Dr. L. O. Howard in a recent notable address, insects do not belong to our day, or psychologically speaking, even to our world. Geology tells us that they inhabited the earth in practically their present forms millions of years previous to the epoch in which man made his somewhat belated appearance. They survived during geological periods when conditions were such that man could not conceivably have maintained an existence on the earth, and throughout the long ensuing ages insects have acquired an adaptability to environment the like of which is far beyond the wildest dreams of man, even with the help of his ingenious artifices, ever to attain. The means of survival possessed by many insects are most astonishing and so plastic and variable as to insure their perpetuation indefinitely and under almost all imaginable conditions. Fancy, for instance, a creature capable of living in pools of crude petroleum and even seeming to enjoy it. Preposterous, one would say; and yet this is exactly what a two-winged fly of the family Ephydridæ (*Psilopa petrolei*) has been observed to do in California. The astonishing fecundity of insects is another means by which they maintain themselves in the face of great obstacles, and were it not for their general habit of preying upon one another, thus effectually checking multiplication, they would very soon become the sole inhabitants of the dry land portions of the globe. This warfare of insect against insect takes a multitude of forms, and it is merely a few of these and their significance to man which I propose to discuss.

These insect legions often are, for purposes of convenience, divided by scientists into two general classes, namely, the true parasites and the so-called predators. In point of fact, however, the line of demarcation between these categories is so slight as practically to be imperceptible. To the predators, strictly speaking, belong such familiar forms as the spiders, the ant lions, ambush bugs, and tiger beetles, which secure their prey by stealth or force, devouring it on the spot without any attempt to utilize it as food for their progeny. On the other extreme are such wonderful creatures as the digger wasps whose habits have been so delightfully described by the Peckhams in their book called *The Solitary Wasps*, and which hunt caterpillars and other insects in order to carry them bodily to their lairs to provide food for young, the eggs of which are still to be laid. These ingenious creatures usually are also included under the general term of predators. Other familiar forms of similar habits are the mud wasps, which provision their nests with spiders. These habits are so similar to those of some of the so-called external parasites of insects as to indicate the possible origin of that particular form of parasitism. However interesting the habits of these predatory insects, it is of the true parasites, exclusive of those occurring on man and the lower animals, that I am about to speak.

By far the greater number of insect parasites of insects are found in two great orders of these creatures, namely, the Hymenoptera, or wasp-like insects, and the Diptera, or two-winged fly-like insects. Of the two general groups, the wasp-like parasites doubtless are the most numerous and generally are considered more highly specialized in their habits and host relations, although some of the fly-like parasites are most remarkable in this respect. Many of the parasitic wasps are inclined to attack only insects belonging to a restricted group, as family, genus, or even species. Some of them, however, attack insects belonging to entirely different orders, but which have something in common as regards their habits of existence. In this way we find parasites of the Hessian fly attacking the wheat jointworm and the wheat stem sawfly, which are wasps and live concealed within the stems of wheat, as does the former insect, which is a gnatlike fly.

One very curious and remarkable wasplike parasite is the long-sting, which confines its attacks to a single genus of related insects (*Tremex* sp.). This parasite, by the exercise of some sense unknown to us, locates the burrows of its host deep within the trunks of hardwood trees, and often forces its hairlike egg tube several inches into the dense woody tissue of such trees in order to lay its eggs in the burrows of the *Tremex*. Sometimes

*Read before the Manitoba Natural History Society, April 19, 1923.

the parasite pays a heavy penalty for her attack, in being unable to withdraw the tube, and so perishes miserably in this position. The species just mentioned is a comparatively large insect, but the vast majority of wasplike parasites are so very small as generally to be completely overlooked by all but a few naturalists who are intent on studying their habits. When dead, these tiny creatures appear to the unaided eye merely as small specks of black or metallic dust, so minute is their size. Among these very small forms are many which are exceedingly beneficial to man, such as the parasites of the plant lice and the scale insects. Members of another very specialized group (the Myrmaridæ) attack the eggs of certain leaf-hoppers, beetles, and other insects. Some of these apparently delicate aerial creatures are known to dive under the surface of quiet water and move about there in search of the eggs of their respective hosts.

I have already mentioned the great fecundity of insects in general, but this characteristic is further enhanced in some wasplike insects by the power of certain species to produce many individuals from a single egg. This faculty has been termed by scientists "polyembryony". In the case of one of the common cutworm parasites (*Copidosoma*) as many as 3000 individuals may result from the deposition of a single egg of the parasite which is deposited in the egg of the host, the resulting individuals emerging several months later from the carcase of the nearly mature caterpillar.

The flylike parasites of insects, while somewhat less specialized than those we have just been discussing, are quite wonderful in their adaptations to the host insects and the provisions that they have adopted for the entrance of their eggs or progeny into the bodies of the insects which they are subsequently to destroy.

There is a vast group of parasitic flies, usually referred to scientifically as the Tachinidæ, although recently scientists have been inclined to subdivide this immense family. These insects vary in size from slightly larger than a common mosquito to the size of a bumble bee, but the vast majority of them are not very different in appearance from the common house fly. Most of them are of sombre color, although a few are banded with red or gold. Unlike the wasplike parasites, they are not known to attack each other, but parasitize insects belonging to several other orders, and are especially numerous as parasites of the caterpillars of moths and butterflies. The commonest and best known of these flies attack their host by attaching their eggs to the external surface of the insect attacked. For a long time it was supposed that all of such parasitic flies had similar habits of gaining access to their hosts, but investigations conducted for the Federal Bureau of Entomology at Melrose Highlands, Massachusetts, in 1907 and 1908, by Dr. C. H. T. Townsend, assisted by a young Canadian, Mr. W. R. Thompson, showed that many of these flies have very different habits. One group of these parasites deposits its very minute eggs on the food plants of the caterpillar and they are subsequently swallowed by the caterpillar with its ordinary food. The results of this involuntary omelet are serious for the caterpillar, as the eggs hatch within it and the young maggots bore their way into the body of the host, subsequently destroying it. A second group was found to deposit its living maggots on the food plant of its prospective host, such maggots afterwards attaching themselves to the caterpillar and subsequently boring through the body wall of the insect. All of these flylike parasites, so far as known, are internal feeders, while many wasplike parasites feed by clinging to the outside of their hosts, as is the case with *Polysphincta*, an Ichneumonid parasite of spiders.

Still another large group of flylike parasites were discovered to thrust their living maggots or eggs into the bodies of their victims. Some years ago, as I was observing several individuals of the common striped cucumber beetle in my garden, there suddenly appeared a small parasitic fly, which pounced upon one of the beetles, and, grappling with it, fell instantly to the ground. This happened several times, when, securing an insect net, I captured several of both flies and beetles while their struggles were going on. Upon examination, the fly was found to possess a most astonishing development of the abdominal appendages. This led to an examination of the beetles for evidences of attack, when it was discovered that each of them had been punctured by the swordlike apparatus of the fly. Strange to say, the holes made by this instrument did not occur, as one would expect, in the soft under parts of the bodies of the beetles, but directly through the hard wing covers of the insects. I afterwards had the pleasure of rearing this fly from beetles which had been attacked, thus proving that the parasite actually did succeed in depositing its eggs or larvæ within the bodies of the beetles. This is one of the parasitic flies (*Neocelatoria setosa* Coq.) which seems to confine its attacks to a single species of insect.

Both the flylike and the wasplike parasites have several or many generations in a single season, thus multiplying much more rapidly than their host insects, which usually have but a single or double generation per annum. In this way, the parasites may become so numerous as to reduce to a negligible minimum many species of insects that otherwise might become dangerous pests.

This ability of the parasite to overtake its host under favorable conditions has led entomologists to attempt to make use of parasites in attacking insect pests that would be difficult to control in any other way. Some of such efforts have met with signal success, and these instances have been admirably summarized by Dr. L. O. Howard in the Yearbook of the United States Department of Agriculture for 1916. One of the most striking of these successes was the introduction from Australia by Federal entomologists of a lady bird (*Vedalia cardinalis*) into California, which very soon succeeded in overtaking the fluted scale, an Australian pest which had become accidentally introduced into that state. This insect threatened to destroy the citrus fruit industry of California, but has since almost disappeared as an economic pest.

A similar instance of success was achieved in the case of the sugar cane leaf hopper in the Hawaiian Islands. This pest had been accidentally imported from Australia, probably with sugar cane seed, and was doing immense damage to the sugar industry. Experts were dispatched to Australia and succeeded, after a time, in securing an egg parasite of the leaf hopper, which has since effected satisfactory control of that pest.

Similar work on a very large scale has been done by the Federal Department in the control of the gipsy and brown-tail moths, which are important enemies of forest and shade trees. Of these efforts Dr. Howard says: "On the whole, this work has been very successful and has helped in bringing about infinitely better conditions in New England so far as these pests are concerned."

It should be appreciated that in all this work of the importation of parasites from foreign countries for the control of introduced insect pests, it is very necessary to exercise the greatest care to secure a pure culture of the desired parasite in order to exclude the secondary parasites or parasites of the desired parasitic species. Such care is necessary because in many cases these parasites of parasites quickly would render such work useless were they to be accidentally introduced with their host. In this connection, probably you will remember Swift's famous lines, which appear in a poem called "A Rhapsody":—

"So naturalists observe a flea,
Has smaller fleas that on him prey,
And these have smaller still to bite 'em,
And so proceed ad infinitum."

A garbled version of this verse runs thus:—

"As larger fleas have smaller fleas,
Upon their legs to bite 'em,
Thus lesser fleas have little fleas
And so ad infinitun."

This is almost literally true as regards the useful parasites, except that the parasites of parasites are not known to live on the legs of their hosts. There is, however, a very curious fly (*Aphidoletes meridionalis* Felt.), a predator of plant lice, whose larva attacks its victims by puncturing their knee joints and thus draining away their vital fluids in a very short time.

The work upon which I am engaged in the United States Federal Bureau of Entomology is the investigation of the insects affecting such staple crops as wheat, rye, barley, corn, and the various forage crops. This includes also the supervision of the research and control work in connection with the European corn borer, which recently has invaded the Province of Ontario in the Dominion. The bearing of parasitic insects on some phases of our work will now be briefly discussed. The field is a large one and therefore only a few of the ways in which the parasites affect this work can be touched upon.

It may seem like bringing coals to Newcastle to mention grasshoppers in Manitoba, because I know that your entomologists and farmers have been fighting them vigorously for several years past, and probably would be more than satisfied never to hear the word grasshopper mentioned again. There is, however, one very interesting fly parasite of grasshoppers which seems to deserve special mention. I refer to the species known scientifically as *Sarcophaga kellyi*. This fly occurs abundantly in Manitoba and the western United States wherever grasshoppers are numerous. It has the curious habit of darting after the grasshoppers while they are in flight and depositing its live maggots on the wings and bodies of the insects. Although this parasite often is very numerous, the part it actually plays in reducing infestation of grasshoppers seems problematical. It is, in turn, preyed upon by several species of wasplike parasites, and these may limit its usefulness as an enemy of grasshoppers.

Before leaving this subject, I am going to repeat a few classical lines learned in boyhood, which I believe will be appreciated by Manitobans:—

"A grasshopper lit in a field of wheat,
Then settled down and began to eat;
He et all day and he et all night,
And what he did to that field was a fright,
Then he wiped his mouth on the farmer's ear
And said: 'we had mighty fine crops this year'."

In 1911 and 1912 there appeared on the cattle ranges of northeastern New Mexico a large, yellowish caterpillar bearing poisonous spines on its body. It is similar in a way to the very common, poisonous caterpillar of the Io moth. These caterpillars not only ate the range grasses extensively but spun the grass over with a light web and shed their poisonous spines right and left so as to render the range grasses unpalatable to the cattle. The large range owners secured an appropriation from

the Government for an investigation of the pest and in 1913 a camp was established on the range for the accomodation of the entomologists detailed by the Bureau to fight this pest. This range land was of comparatively low value and for this reason the methods of control ordinarily resorted to could not be adopted because of their disproportionate cost. It was decided, therefore, to introduce as rapidly as possible insect parasites and predators of foreign origin, which it was hoped would prey on the range caterpillars. Through the courtesy of Mr. A. F. Burgess, in charge of the gipsy moth work for the Federal Bureau of Entomology, quantities of a large ground beetle and pupæ of a parasitic fly were sent to New Mexico, and finally liberated in large numbers. Within a few years the range caterpillar began to disappear, and at present it is very scarce in that part of the country. The range owners and people of that region insist that the introduced parasites solved their problem, but it seems probable that a native egg parasite (*Anastatus semiflavidus*) which appeared and was carefully studied by Government investigators, may have done far more good than the species introduced by man.

A serious pest of wheat with which Manitoba entomologists are quite familiar is the wheat stem sawfly. This insect probably was an inhabitant of the native grasses before wheat began to be grown in this region. In the United States it still inhabits such grasses to a large extent, and in this habitat is intensely parasitized and thus has not yet become a pest of prime importance. Its principal parasite is a very small wasplike insect of a beautiful bronze-green color (*Pleurotropis utahensis*). As many as twelve of these parasites have been observed by Mr. C. N. Ainslie to inhabit one grub of the sawfly.

Among the troublesome insect pests with which the corn growers of the north central and eastern States have to cope are the grubs of the common May beetles, usually termed white grubs. Fortunately these grubs have many parasites and predators, among the most important of which are digger wasps of peculiar habits, and others are flies belonging to several families. The wasps attack the grubs in their immature stages, while the flies attack both the grubs and the adult beetles. According to Professor J. J. Davis, the black digger wasps of the genus *Tiphia* are without doubt the most efficient of the many parasites known to attack these insects. These wasps paralyze the grub by stinging it, afterwards gluing their eggs firmly to the body of the insect. When the grub of the parasite hatches, it feeds on the body contents of the beetle larva or grub, which regains its activity for a time and does not succumb until the parasite is nearly mature.

A parasite of similar habits is a handsome yellow and black wasp, several species of which attack white grubs (*Elis* spp.). The habits of these wasps are quite similar to those just described, except that they paralyze the white grubs permanently at the time the egg of the wasp is laid.

Another curious wasplike parasite of white grubs is the attenuated, long-bodied species known as *Pelecinus polyturator*. The female of the species is well known, but for many years the male of this peculiar insect was entirely unknown to entomologists. Some years ago an amateur entomologist located in Philadelphia discovered a means of securing male specimens, and offered them for sale at an exorbitant price. He finally died without divulging his method of securing these specimens of the male insect, but it is supposed that he caged the female parasites and placed them out of doors during the night, and collected the males which were attracted in this way, although so far as I know no one has been able to repeat this experiment successfully.

Among the most recent attempts to utilize the parasitic enemies of injurious insect pests is the effort now being made by the Federal Department of Agriculture to establish insect enemies of the European corn borer in New England. The corn borer was found in 1920 to be present in the southern part of the Province of Ontario, and has become a corn pest of prime importance in that region. The present situation there has been ably summarized by the Dominion experts in the 52nd Annual Report of the Entomological Society of Ontario. In the United States the insect was recognized and injurious in eastern Massachusetts in 1917, and has since intensified its injuries and spread to the adjoining states. It also is present in small numbers in New York, Pennsylvania, Ohio, and Michigan. Realizing that the control of the pest by natural or biological means was likely to be a factor of great importance in the control of the insect, Dr. L. O. Howard, Chief of the Federal Bureau of Entomology, established during the fall of 1919 a small entomological force in southwestern France for the study of the European parasites of the pest. A brilliant young Canadian, Dr. W. R. Thompson, was placed in charge of this work, which has steadily progressed under his able direction. He very quickly was able to find several important parasites of the corn borer, and an increasing supply of such enemies has been coming from France to America during the past two years. Probably the most promising of the parasites so far discovered is a small black wasp, which first stings and paralyzes the nearly full grown caterpillar of the corn borer, afterwards laying numerous eggs on the outside of the caterpillar's body. In a short time these eggs

hatch and the developing maggots feed upon the body of the host until mature, when they spin silken cocoons and prepare to become winged adults. These parasites can be bred so rapidly under laboratory conditions that it was possible during the summer of 1922 to liberate in Massachusetts considerably more than one million specimens of this beneficial wasp. An interesting supplementary development of the corn borer parasite introduction was the discovery that the species just discussed could easily be induced to attack the sugar cane moth borer of the gulf states, and supplies of the parasite are being reared in a laboratory near New Orleans for liberation as an enemy of the insect in that region. A supply of this parasite will be available for introduction in the Dominion of Canada this spring, and I am informed by Mr. Arthur Gibson, Dominion Entomologist, that he has been authorized to proceed with this work.

It should be understood, however, that these parasitic introductions are not always completely successful, and that in many cases it requires a long series of years before the parasites can overtake their hosts and establish a degree of control to be considered satisfactory from a commercial point of view. An illustration of this fact is the case of the alfalfa weevil, which was discovered in Utah some fifteen years ago. This is a beetle whose native home was southern Europe. Efforts were begun in 1911 to secure the parasitic enemies of this pest from France and Italy, and subsequently, in 1912 and 1913, satisfactory colonies of several parasites were liberated in the vicinity of Salt Lake. Among these was one which since has become firmly established (*Bathyplectes curculionis*) and has dispersed almost as fast as the alfalfa weevil itself. The rate of parasitism in certain localities has risen to 75% or 80%, but nevertheless this parasite has not yet overtaken its host, and may not do so for several years to come, although it has been present for at least ten years. Quite recently the Bureau has dispatched another expert to France in order to secure additional parasites of the alfalfa weevil for introduction into this region, and it is hoped to secure a nearly complete series of the principal insect parasites of this injurious species.

BANDING GLAUCOUS-WINGED GULLS

With Other Notes on a Colony in Southern British Columbia

By THEED PEARSE

THESE notes on the Glaucous-winged Gull (*L. glaucescens*) are the result of three visits to the breeding colony on Mittlenach, an island in the Gulf of Georgia just about where the 50th parallel of latitude crosses. On the first occasion the date was 1st July, 1920, and it was from conditions then found that the end of July was, in 1922, selected as the most suitable date for banding purposes (in 1920 no banding was done). In 1920 I spent three hours on the island, in 1922 our party were there from 29th to 31st July and in 1923 I spent about eight hours on Sunday, the 12th August, there.

The island is situated about equidistant from the mainland, Vancouver Island and the neighbouring islands, Valdez, Cortez and Savory. It is under 100 acres in extent, all rock, rising steeply from the sea on the south side to a height of about 100 feet and dropping away more gradually on the north side, where a neck of level land connects it with a smaller rock. On the east side is the boat landing, though not much good with a southeaster blowing, and on the west side of the neck of land is a nice shingle beach that has suggestions, in vain, of Black Oyster-catcher. There are thickets of trees, Cottonwood chiefly, growing in the gullies where the rain collects, and, though on each occasion our visit followed dry weather, the grass was still green in these places. There is no other water supply on the island but as sheep are pastured there presumably there is always some water to be obtained from this seepage. Owing to the stratified formation of the rock, it easy to get about, even on the steep south side.

No birds were banded on the first occasion; we were on the island only for three hours, but this was long enough to get a general look around. We did not see a single young bird; the nearest approach being two nests in which the eggs were chipping. Many nests had eggs, though most were short of the full clutch of three. There were no eggs near the landing, though many empty nests, and it was very evident that there, at all events, the birds had been recently robbed. Evidence of robbing was not so apparent in the other parts of the island, though I am now inclined to think that what we took to be evidence of not having been robbed was not reliable. I allude to the absence of empty nests that clearly had been used. This year I particularly noticed that such nests were not to be seen in any quantity whereas I know that the birds have been extensively robbed and there is no doubt that in 1920 the systematic robbing had taken place before we were

there. I suggest and think it is the case that after a nest has been robbed and therefore given up the owning birds or others make use of the material to build other nests.

Given only a few chipping eggs the 1st July, the end of the month should find most eggs hatched out and should be accordingly a suitable date for banding. Results in both 1922 and 1923 proved this correct. Now the first week in July, for eggs, or the first part of August to find young Glaucous-wings is contrary to all authorities and requires some explanation. In Bent's *Life Histories of North American Gulls and Terns* the British Columbia dates given are mid-June to mid-July for eggs and downy young are mentioned as having been found as early as the first week in July on the Pribilof Islands. (Walrus Island, one of the group. On June 13th nests are described as containing three well incubated eggs.) As mentioned before, in 1920 it was evident that the birds had been robbed more or less, but nests had been overlooked, as witnessed by those containing chipping eggs. Eggs chipping on the 1st July would mean young birds nearly ready to fly the end of the month. Moreover, if these particular nests had been overlooked why should not other and earlier nests also have been missed by the egg hunters (remember we did not go all over the island in 1920) so that in 1920 there probably were young birds hatched out on the 1st July and there was no reason to assume any abnormal nesting conditions (except as the result of human interference).

I am quite satisfied that in 1922 there were no young birds about that had been hatched as early as 1st July. On this occasion, with a friend, I went thoroughly over the rock, putting in the greater part of the forty-eight hours spent there in hunting for young birds to band, with the result that we found 104 young birds old enough to band but did not see a single young bird on the wing or even large enough to get away, nor were there any birds of the year resting on the water as any such must have been seen by Messrs. P. A. Taverner and H. M. Laing, two of the party, who were around the island collecting, on and off, during the time we were there.

Of the 104 birds banded, the majority were only a few days old; not more than thirty could have been described as half grown and of these thirty half still showed down. Moreover, we had to leave about a dozen as being too young to band so that it would be safe to say that the young bird population on the 31st July was under 150. Add to these the nests with eggs, many with incomplete clutches, and though, unfortunately, I did not keep an exact record of these, it would be safe to estimate 150 as covering all possibilities of eggs that could hatch, so that the total number of young Gulls that could by any possibility have resulted from this colony in 1922 was three hundred. When moving around a rock like Mittlenach it is not easy to estimate the number of old birds but in this instance it was possible to get an estimate arrived at from going around the island as Messrs. Taverner and Laing were doing, as well as from working over the rock itself, and we all agreed that the number of old birds there was about five hundred. When I say old birds, I mean birds in the full plumage. There were very few other than full-plumaged birds; about fifty birds that looked like birds of the previous year, but these remained resting on the water and also seemed to keep together. I saw only one immature bird flying around with the old birds at the nests.

A crop of three hundred young from some two hundred and fifty pairs of adults is a very unsatisfactory result, and the only solution that I can put forward is that the nests are systematically robbed by Indians and fishermen. That this was the case is supported by what has taken place this year. Last year I reported conditions to the Parks Department at Ottawa and, through Mr. Munro, Officer under the Migratory Birds Convention Act, in conjunction with the British Columbia Game Conservation Board, the island this year received some protection. Two game wardens were stationed there for ten days at the beginning of June, and, shortly after they had left, the Game Board's launch spent a few days there. Several Indians and others were caught and fined and there is no question but that a check was put on the wholesale robbery. I have had a talk with Mr. R. M. Stewart, one of the wardens, and he tells me that between the time of his leaving and the Game Board's launch going there, the place was cleaned of eggs, so that notwithstanding the well-meaning attempts at protection, owing to their not being carried far enough, the result this year was much the same. At the time of Mr. Stewart's first visit there were plenty of eggs so that, given a chance, conditions at the Mittlenach colony of Glaucous-wings should be the same as at other colonies and by the end of July there should be very few young birds that were not on the wing.

For various reasons, this year (1923) I was unable to get to the island until August 12th and I was very doubtful as to what banding results I should get; if the results of the protection efforts had been satisfactory, it was likely that most young birds would have flown. Owing to my being able to put in only one day, time did not suffice to work the entire island (we left Courtenay at 5 a.m. and did not get back till after ten at night), but during the seven hours or so I was there

I managed to look over about one-third. Unfortunately the small boy who went to assist, not being really at all ornithologically inclined, soon tired of his job (he was punished later by being very sick on the return trip when the wind and tide churned up quite a little sea). The result of my efforts this year was to band exactly half the number done last year, but I do not think 52 represented the number of birds reared on the area I covered. This year the birds were usually away from the nest and one would come across what was probably one of a nest of three without finding the other two. Moreover, in several cases the young birds took to wing, the sight of the hated human providing the incentive to the final effort. Only one bird was too small to ring and I saw two nests of three eggs each, one of which was chipping while the other lot looked fresh. One nest with nothing in it certainly looked newly made.

Compared with the conditions of last year the results of the protection were not very satisfactory; even allowing for as many birds that had flown, the estimated number of birds was only about the same as last year. It is hard to carry in one's mind the different nests from year to year, but it did strike me that there were more nests on the north side of the island than last year, in fact this must have been so because up to lunch time I had not banded twenty birds so that the district covered in the afternoon must have yielded as many again as that covered in the morning. In working over the island this year I made for the more likely spots which made the morning results very disappointing.

There did not seem to be as many old birds about, either around the nests or resting at sea, but this is only an impression. Mr. Stewart estimated the number of birds there in June at over 1500 and he reckoned the number of nests at 600. It is therefore evident that many pairs had given up the idea of nesting as useless and the nests present in August were but a sorry remnant. The only way the colony can be properly protected is for a watcher to be there from the beginning to the end of June.

Spending two days last year and a day this year with the Glaucous-wings gives one some insight into their home life. They are peaceful birds, and we saw very little fighting; when sitting each pair has its own territory around the nest but the dividing line must be difficult to define in some of the more populous bluffs; when a neighbour came too near, the aggrieved bird would only stretch out its head and give a note of expostulation. When we were at a nest with young birds or there were young birds about and especially when the youngsters were scrambling over the rocks, the old birds would be very noisy, swooping down and in some cases coming quite close so that one could feel the swish of the wings. Of course as soon as one starts over the rock, and all the time one is there, one is followed by birds hovering overhead, but it is only as the nests or young are approached that they become aggressive.

In 1922, when the birds were very young, or there were eggs, after the birds had been disturbed and had settled down again, one, presumably the male bird, on returning, would hold his head down and utter a sort of crooning, gutteral "quawk". It is difficult to describe the note, but it suggested most strongly complete satisfaction with himself, his family, and his surroundings. Sometimes this note would be uttered as the bird approached his mate standing on a rock. This year I did not notice any bird doing this.

One gets a very good idea of what is being fed to the young birds as, generally, when they are handled the first thing they do is to be very sick. In 1923, herring fry seemed to be the general food, more or less digested by the parent bird. At one nest fairly grown youngsters disgorged about a dozen of these fry. This year there was much more variety. Sometimes the food was small herrings, in no case herring fry as last year, in another case shell fish, cockles I think, in another nothing but shrimp fry and in another what I took to be star-fish remains. It seemed very peculiar to find the parents making use of so many different kinds of food. Possibly herring fry is the regular diet but at this time they were not about near the island and so the parent bird had to take substitutes. Last year we saw young birds being fed but this year they all appeared to have had their meal.

The young birds are hatched with a very strong idea of the necessity of concealment from enemies; even those just emerged from the egg would be found pressed into some cranny and quite immovable. The great idea seemed to be to hide the head, ostrich-like. I think the young birds would leave the nest or make efforts at concealment on a warning note from the parent bird. Young birds half grown can run pretty well and are stupidly regardless of where they go but tumbling down over the ledges did not seem to hurt them. The birds that were just about flying would take wing and flutter into bushes but, not being able to perch, they crashed through and then disappeared into the bracken or other cover. There is no doubt but that in 1923 many eluded banding by this means. On one occasion we witnessed what looked like the youngster's first real effort at long flight. One young bird, being frightened, flew and then found that it had to fly down to the water. The old birds flew under it

until it safely reached its destination, but when there it seemed quite at home.

The nests are distributed generally over the island but there is a marked preference for rocky ledges and places where the bare rock stands up above the neighbouring ground. Mr. Stewart tells me he found nests on logs on the beach and some on the shingle itself. I did not see any in these positions when I was there. The nest commences as a very comfortable and compact one, made chiefly of moss, but by the time the young birds have finished with it there are only some flattened-out remains left.

This year there were more signs of moulting but last year scarcely any, which looks as though moulting does not really take place until after nesting duties are finished; it would be interesting to compare conditions with those in a colony where the birds are not so harried.

In view of the thousands of Glaucous-wings that pass down these coasts or are resident here, it is not likely that any great results will be derived from banding a trifling number such as that which was possible but there have already been returns that give matter for reflection. December 15th, 1922, a bird was recovered at Rodonda Bay and another was, on 15th February, 1923, captured and liberated "on the Pacific Coast 86 miles N. of Vancouver." Rodonda Islands are within a few miles of Mittlenach, which is itself just about 86 miles north of Vancouver (unfortunately I was unable to trace the person that sent in this record to some sporting paper, and so to ascertain more exactly where this bird was captured). Moreover, a banded bird was seen during the winter at Campbell River and Little River, both of which places are about twelve miles from Mittlenach, and a banded bird was seen on the boat between Nanaimo and Vancouver last April. Of course, these last three instances may not have been any of my birds, though I do not know of anyone else banding Glaucous-wings, or they may have been repeats, but these birds do suggest, at least, that here in southern British Columbia the Glaucous-wings of the year remain for the first winter around their original home and do not join the endless stream of old and young birds that must pass south over or within a few miles of Mittlenach. Another theory that might be put forward is that here at the southern limit of the breeding range there is no migration in winter. Bent gives the southern limit of the breeding range as Destruction Island, Washington.

JULY BIRD NOTES FROM BONAVENTURE ISLAND, QUEBEC

By H. L. STODDARD

THE month of July, 1922, was spent by the writer on Bonaventure Island as a member of an expedition from the Public Museum of the City of Milwaukee, Wis. Although our time was fully occupied in collecting material for a large habitat group of the nesting sea birds and with photography, careful notes on the bird-life were gathered where possible.

As Dr. Charles W. Townsend[1] has listed the birds of this region very thoroughly, only those of my own notes that cover species not listed by him, or that are considered of interest when used in connection with his lists are here presented.

1. *Oceanodroma leucorhoa.* LEACH'S PETREL.—Foxes are playing sad havoc with this species on Bonaventure Island, and if the foxes are not exterminated here the Petrels will be. The wings and tails of the victims are scattered more or less over all the island, and are to be found by dozens in the vicinity of the Petrels' nesting burrows. A fox was seen by Willie Duval, Honorary Game Warden, and the writer on July second as it was eating one of these birds, and tufts of red fur, caught on the twigs here and there where the Petrels are thickest, leave no doubt as to the culprits' identity. The foxes are said to cross on the ice during the winter.

2. *Phalacrocorax carbo.* COMMON CORMORANT.—Two fine adults of this species were studied with binoculars at close range on July 1st, as they sat on the top of a huge mass of fallen rock on the north side of the island. They were in full breeding plumage, the white at the base of the gular pouch and on the flanks first attracting our attention. As we thought it possible that they might be breeding, a careful watch was kept for them whenever we circled the island but they were never seen again. Willie Duval, who was raised upon the island and who is keenly observant and interested in the birds, stated that he had never noticed them before. This species appears to be an addition to the Gaspé list.

3. *Phalacrocorax a. auritus.* DOUBLE-CRESTED CORMORANT.—Four thriving colonies of these Cormorants were observed on the south side of Gaspé Bay, between Point St. Peter and the town of Gaspé. Two of them must have contained about two hundred nests each, while the other two contained from one to two dozen each. This would indicate a considerable increase since Taverner's observations in 1914-1915.

4. *Oidemia americana.* AMERICAN SCOTER.—Two small flocks of perhaps forty birds were seen July 10th, as we were rounding the island in a motor-

(1) 'Notes on the Summer Birds of the Gaspé Peninsula, Province of Quebec', *Canadian Field-Naturalist*, Vol. XXXIV. 1920, pp. 78-80 and 87-95, and 'Additional Notes on the Birds of the Gaspé Peninsula' *ibid*, Vol. XXXVII, pp. 6-11.

boat. They dove once or twice, swimming a considerable distance under water. As we approached the flock again they all dove but two which were making frantic attempts to get under. These were picked up by their wildly waving feet, by our companion in a rowboat, and were found to be in the eclipse plumage and flightless. Stranger than their actions and ease of capture was the fact that they drooped and died almost immediately after they were placed in our boat, whether from fright or exhaustion, or some other cause, it is hard to say. These birds, which were both males, were in perfect condition and picked up by hand without the least injury. Death without apparent cause has also been witnessed in the case of newly captured young waders.

5. *Somateria mollissima dresseri.* AMERICAN EIDER.—Seven individuals of this sub-species, or of the Northern Eider, from which it is supposedly indistinguishable in the field, were watched with the binoculars as they played about in the water at the foot of the three hundred foot cliffs on July 1st. All were in the plumage of the female, although a full plumaged male was seen with this or another similar flock later in the day. They are listed as *dresseri* according to probability of occurrence.

6. *Branta bernicla glaucogastra.* BRANT.—A lone individual was observed at sea about a mile north-east of Bonaventure Island on July 20th, and the same bird or another on a rock at the water's edge on the north side of the island a day later. It allowed a rather close approach.

7. *Lagopus r. rupestris.* ROCK PTARMIGAN.—An adult female of this species was taken by Mr. George Shrosbree, laeder of our party, on July 8th. The bird was first observed on July 2nd in an iris field at the edge of the evergreens on the north-east side of the island, near where it was later collected. It was very tame and three of us very nearly succeeded in capturing it by hand. We had no gun with us at the time.

Our determination of the specimen was later verified by Mr. L. Griscom of the American Museum, who notes that it was "changing from adult breeding into eclipse plumage". This is apparently the first record for the Gaspé Peninsula. In all probability the bird was a stray from more mountainous regions.

9. *Nyctea nyctea.* SNOWY OWL.—Remains of a Snowy Owl that had met its death in some manner the previous winter were found in the woods of Bonaventure Island.

10. *Loxia leucoptera.* WHITE-WINGED CROSSBILL.—This species was abundant on the island throughout our stay, occurring in flocks of from a dozen or two to over two hundred individuals each. They were frequently heard singing on our early morning trips across the island. The light pink of the worn plumage of this season makes the birds nearly invisible among the beautifully tinted cones on which they feed. The condition of birds of the year collected from the flocks indicated a very early breeding season.

10. *Passerella i. iliaca.* FOX SPARROW.—Three or four individuals seen or heard singing almost daily on the island.

11. *Regulus s. satrapa.* GOLDEN-CROWNED KINGLET.—Parents seen feeding fully grown young on Bonaventure Island, July 23-24th. and 26th.

NOTES AND OBSERVATIONS

A RESOLUTION FAVORING THE COMPLETE SAFEGUARDING, IN PERPETUITY, OF ALL NATIONAL PARKS IN THE UNITED STATES AND IN CANADA, AGAINST EVERY ECONOMIC OR COMMERCIAL USE OF WHATEVER KIND.

Adopted by the Executive Committee of the Council of the American Association for the Advancement of Science at the Regular Fall Meeting of the Committee, held October 21, 1922.

WHEREAS, by repeated action by Congress for more than half a century, widely approved by scientific and other societies and by the public generally, the National Parks of the United States have been completely conserved from industrial uses so as to constitute a system of National Museums of Native America; and

WHEREAS, one of the national parks of Canada is similarly completely conserved; and

WHEREAS, the combined National Parks System of both countries, covering geological, biological and geographical examples from the Alaska Range, through the Canadian Rockies, to the Grand Canyon of Arizona, if preserved untouched will constitute an unique Continental Exposition of inestimable value to science and to the popular education of future generations; and

WHEREAS, at the option of a single official of the Government, several of the national parks in the United States are nevertheless open to mining and grazing, while the control of water power in future parks has recently been surrendered to the Water Power Commission; and all but one of the national parks in Canada are similarly open to certain economic or commercial uses; and

WHEREAS, every interference with their natural condition will destroy the usefulness of these areas to science and education; and

WHEREAS, this generation can pass on to future generations no greater gift than these parks in their primitive condition. Therefore,

BE IT RESOLVED, That the American Association for the Advancement of Science earnestly requests the people and the Congress of the United States and the people and the Parliament of the Dominion of Canada to secure such amendments of existing law and the enactment of such new laws as will give to all units in the international parks system complete conservation alike, and will safeguard them against every industrial use either under private or public control at least until careful study shall justify the elimination of any part from park classification.

CIRCUMVENTING THE HOUSE SPARROW.—Many of us have experienced exasperation at Sparrows roosting in the vines on the house. Not only do their noisy debates rob the early morning hours of slumber, but they often gather in such numbers as to make a filthy mess. Another objection is that such a community grows and attracts to itself a Sparrow population that lovers of native birds would prefer to have patronize more distant localities. It is almost useless to drive them out by ordinary methods, as they immediately return, but this summer I think we solved the question of how to be rid of the pests. Being troubled with a large flock in the Virginia Creeper overgrowing the house, we went out late one night, long after dark, when each rascally little head was tucked under its rascally little wing and all were dreaming peacefully of new ways in which to make themselves objectionable. With a long pole the vines were beaten thoroughly. There was a miniature thunder of frightened wings, a few startled peeps, and the whole community vacated their comfortable dormitory and, in the dark, sought new quarters as best they could on the spur of the moment. Incidentally a large scoop net on the end of the pole caught several as they burst into it on their first dazed awakening, but that was not a necessary part of the operation. The intention had been to catch a few each night. It seemed possible that if a few were so disposed of each time the annoyance of their presence would be gradually reduced and eventually there would be one flock less in the neighborhood to monopolize bird food and bird boxes that were reserved for their betters. But, behold, the next night, on making the rounds, there was not a single Sparrow in the vines, and so it has continued ever since. Occasionally one or two individuals are routed out from the shelter, which but goes to show that vigilance is the price of other things besides safety, but does not indicate a failure. You can drive Sparrows away by day again and again only to have them return as soon as your back is turned or even to seek the far side of the house while you are beating the near one. But at night it is different and if they feel that they are unsafe in the hours of their sleepy helplessness, it is a "better 'ole" for them. This experience may assist others in freeing their premises from the nuisances. Probably tearing their nests down or driving them from boxes at night will also be found more effective than doing so in the day time. At least one bird that was driven from a preempted box just at dusk did not return.

Another example of House Sparrow psychology was an experience we had with the species a number of years ago. There was a large flock of them in the neighborhood that winter and, as spring was coming on, it seemed desirable that something be done to thin their ranks and prevent their monopolizing all the bird boxes and nesting sites before more desirable tenants returned. Poison was advocated by one of the U.S. Biological Survey Bulletins and determined upon by us. First grain was temptingly spread daily on the hardened snow at the back of the yard. The Sparrows hailed the largess with cheeps of delight and hungry energy and were soon feeding regularly at it. Then the clean grain was replaced by the poisoned. It was scarcely out before the expectant flock began to gather on the wires and fences roundabout. But first one bird flew down before the main crowd fairly arrived and picked up a few preliminary grains. Before it was joined by more it was fluttering spasmodically over the snow. The gathering flock descended to it with many excited chirps, and followed it about in its struggles over the snow. Then it died, and the remaining birds looked at it and at each other, some said "cheep, cheep", and then all flew away—and did not return. The grain remained there until covered by the next snowfall, was replaced by more which was covered in its turn, but no flock of Sparrows fed on it. They were all about the neighbourhood, chirping saucily from nearby points of vantage, but they did not enter our garden again before spring, when the flock disintegrated and betook itself to its individual nesting duties. One or two dead Sparrows with grain in their crops were found nearby, evidently strangers, or ones that did not know or could not learn—the unfit that fell short of the standard of intelligence of the species. It seems remarkable that the sight of one dying Sparrow could instill fear of that immediate neighborhood into the whole flock and that they would remember this fear for several weeks, yet that seems the only interpretation of the facts. A few occasions like this go a long way to explain how, within a few years, the species has spread itself over the whole

continent, adapted itself to the most varied conditions, and resisted constant persecution. To-day, the factor that is finally showing some control over their numbers is not the laws passed by various legislative bodies, bounties on their heads, or poison, trap or gun, but the inevitable advance of science, the replacement of horses in our streets by automotive traction.—P. A. TAVERNER.

LOSS OF WHISTLING SWANS AT NIAGARA FALLS, 1923.—From a newspaper dispatch, printed in Ottawa on Monday, April 2, 1923, it was learned that a number of Swans had been swept over Niagara Falls. Mr. John H. Jackson, Superintendent, Queen Victoria Niagara Falls Park Commission, Niagara Falls, Ontario, was asked for information in this connection and the following account is based upon the data he so kindly furnished.

The first of two accidents to the Swans, in 1923, occurred on Saturday, March 31st, during a heavy snow storm. Previous accidents of this kind have been described by Mr. J. H. Fleming* and it is believed that these birds fell into the very trap he describes by alighting in the upper Niagara River, reaching the upper rapids without seeing them, because of dark, snow, or fog, and being drawn into the rapids without being able to rise from the surface.

Mr. Jackson considers that some do escape by flying at the point where they reach the rapids. The birds which are caught in the current of the rapids are drawn over the Falls; some are killed and others injured.

When this particular flock was drawn over the Falls on Saturday, March 31st, the river was filled with ice almost to the foot of the Falls, and before the Swans had an opportunity to recover from their plunge, almost all of them were swept under the ice. Nine of them did manage to reach the pack ice, but this shifted during the evening, and Mr. Jackson thinks that all the birds were lost. Because of the circumstances it does not seem possible to arrive at the total number lost on this occasion.

There were losses as well on Sunday, April 8th, but Mr. Jackson tells me that the news despatch respecting this second disaster for 1923, which stated that between three and four hundred wild Swans were killed, was grossly exaggerated. Everyone with whom he was able to get in touch and who saw the incident agrees that no such number were destroyed. Two of the Commission's Police Officers estimate that there were as many as fifty Swans in the lower river at one time and this appears to be about the maximum lost.

One specimen only was examined by me, a fine male in the flesh, but six others were secured alive for the Jack Miner Sanctuary at Kingsville Ontario.—HOYES LLOYD.

NOTES ON THE HUDSONIAN GODWIT IN ALBERTA.—Considering the fact that the Hudsonian Godwit (*Limosa hæmastica*) is now regarded as very rare, it might be worth recording that no less than 24 specimens of this species were seen and positively identified by Prof. Rowan and the writer while camping on the shores of a prairie lake in central Alberta this Spring.

The records are as follows: April 29th, 2 flocks of 6 each (also 2 Avocets on this date although on the 30th it snowed all day); May 7th, 2 Hudsonians at the lake and one with a party of Marbled Godwits at a muddy slough a few miles away; May 8th, a flock of 4 Hudsonian and 2 Marbled; May 15th, flock of 3 Hudsonian, 2 Marbled and 1 Willet; May 22, a fine male Hudsonian with 8 or 9 Marbled. One other specimen was seen flying over about May 10th.

The individuals in the parties seen on April 29th were feeding very close together like Dowitchers. Their call-note is a soft "*chip*" (very unlike the harsh notes of the vociferous Marbled) and when alarmed they utter a low Sandpiper-like chattering. Not a single bird was seen on dry land and most of them were wading about in water 4 inches to 6 inches deep, one bird swimming after the manner of a Yellow-legs which has waded out of its depth. Although the Hudsonian Godwits associate with the Marbled the latter bully them considerably, chasing them away if they approach the Marbled too closely when feeding. On the wing the Hudsonian Godwits are easily identified, either by the almost black undersurface of the wings or by the conspicuous white rump contrasting with the black tail, but when at rest with other waders they are much more difficult to pick out, especially if they are not in full summer plumage. When compared with the Marbled they look smaller and much darker, males in summer plumage appearing almost black at a distance. As compared with Willets, they stand with the head drawn closer in to the shoulders and of course the bill is more slender and slightly recurved, although this latter feature is hardly noticeable at a distance.

It is only in the greyer plumages that they are liable to be mistaken for Willets and then only when at rest. The bill of the female Hudsonian is practically the same length as that of the male Marbled, although both vary considerably.

Specimens measured were as follows:

L. fedoa, male, 3·75 inches. Female, 4·75 inches

*Auk, XXV, 1908, pp. 306-9, and *ibid*, XXIX, 1912; pp. 445-448.

L. hæmastica, male, 2·75 inches. Female, 3·625 inches.

The males of both species always have shorter bills than the females. As regards plumage the Husdonian showed considerable variation, several of those seen on April 29th being almost as far advanced as the fine dark bird of May 22nd, while others were heavily tipped with grey. The breasts of the males varied in color from a yellowish brown to a dark brick red. All the females were very much greyer. It is to be hoped that the numbers of this fine wader are increasing under the protection afforded by the Migratory Birds Convention Act.—C. HARROLD.

CARDINAL AT HAMILTON, ONT.—On April 29th, 1923, the Cardinal Grosbeak (*Cardinalis c. cardinalis*) was seen in Hamilton. I observed it for ten minutes. The bright cardinal red with black splash about bill and throat and the prominent crest were the chief means of identification. The bird has been seen by a few people and its appearance here is most unusual.—RUBY R. MILLS.

YELLOW-BILLED CUCKOO AT CAPE ROUGE, QUE.—On July 24th, 1922, I collected a Yellow-billed Cuckoo on the Experimental Farm at Cap Rouge, Quebec. Mr. Taverner, to whom the bird was sent, writes me that this marks a considerable extension of range for that species, as the nearest Canadian record he has for it is Montreal where it is only accidental.—GUS LANGELIER.

BOOK REVIEW

CANADIAN FISHERIES EXPEDITION 1914-15. (Investigations in the Gulf of St. Lawrence and Atlantic Waters of Canada, under the direction of Dr. Johan Hjort, Department of Naval Service, Ottawa, 1919). About 500 pp; many tables, plates, charts and illustrations.

It speaks volumes for Canada's contributions to scientific research that in spite of and during the Great War the Dominion Government carried on marine investigations in three different fields, and that the scientific results gained have now been largely published. I am referring to the Canadian Arctic Expedition, working in arctic Alaska and western Canada; the work at the two Biological Stations at St. Andrews, N.B., and Nanaimo, B.C.; and the Cruises of Government ships in the Gulf of St. Lawrence and off the coasts of Nova Scotia and Newfoundland, in 1915. Reviews of the publication resulting from the two first named undertakings will be found in *The Canadian Field-Naturalist* for November, 1922, and April, 1923.

The volume containing the scientific and economic results of the Canadian Fisheries Expedition, 1914-15, has three Canadians and six Scandinavians as authors. Of the first-mentioned, the Dominion Commissioner of Fisheries, Prof. E. E. Prince, writes the preface, giving an account of the events leading up to the expedition (cruises), and a summary of the principal scientific results obtained, as detailed in the memoirs following.

Of the Norwegians, Dr. Hjort himself contributes an introduction, telling how he got the idea of the investigations during his work in Norwegian waters (so many of the important food-fishes occur on both sides of the Atlantic) and particularly during the cruise of the *Michael Sars*, financed and headed by the famous Scotch (Canadian-born) oceanographer, the late Sir John Murray. It was then observed (see *Depths of the Ocean*, London 1912) that off the Atlantic coasts of Canada and Newfoundland are found natural conditions of the sea, as to depths, salinities, temperatures, and the corresponding characters of plant and animal life, of great importance for understanding of the food-fishes of northern seas. It is this area, where the cold Labrador current meets the warmer water of the Gulf-stream and Sargasso-sea, which has as deciding an influence upon the fishes frequenting the Canadian shores as have the waters between Iceland, Scotland and Norway on the fishes on the other side of the Atlantic. It was then only natural that Dr. Hjort, who had been so successful in fishery-investigations in the waters of northern Europe, should have been asked to investigate similarly Canadian waters, and that he should enlist Norwegian scientists to assist Canadians in the labour of working up the results. It is quite natural that our knowledge of the fishes and conditions found off the Canadian coast is very limited, as only little scientific work has been done here, compared with what has been done in northern Europe.

As for the program for the expedition, it was of course exceedingly important to find out the exact position and extent of the spawning-grounds of the fishes; the occurrence of their eggs and pelagic larvæ (fry); the eventual, geographical "races" of each of the important food-fishes; the depths, salinity and temperatures, etc., at different places; and the distribution of the many pelagic invertebrates which serve as food for the fishes; all of which factors determine the occurrence and migrations of each species of fish.

The field-work in 1914 was limited to a trip by Dr. Hjort along the coast of Nova Scotia, mainly for the purpose of gathering information and samples of the herring. Dr. Hjort's preliminary

report, giving the results of these investigations, was published by the Department of Naval Service in Ottawa, in 1915.

During the winter 1914-15 the final arrangements for the investigations of the following summer were made; and from the end of May to the end of November, 1915, cruises were made by three Canadian boats (*Acadia, Princess* and *No. 33*), in the Gulf of St. Lawrence, and between Newfoundland and Nova Scotia. A biological laboratory was established at Souris, P.E.I., which became the headquarters for the expedition. Two Norwegians were added to the party, Dr. Paul Bjerkan for the titration of the water samples, and Captain Thor Dversen for the special fishery operations on the *33*.

It is not necessary to give in this review an account of the important and interesting results secured by this expedition, because this has been done in so able and readable a way in the preface and the introduction. It is sufficient merely to mention the subjects treated in the memoirs by the seven specialists contributing.

First we have A. Dannevig's account of the fish-eggs and larvæ secured, illustrated by charts showing their distribution, and three heliotyped plates. The identification of pelagic fish-eggs and larvæ, apart from a few well known species, is a difficult undertaking, unless one has a large series of various stages available; and it may be doubted whether Dr. Dannevig's reference of certain eggs and larvæ to European species of fishes never before recorded from the waters of United States and Canada is correct. This refers to eggs and larvæ supposed to belong to the "Boar-fish", a horse-mackerel (*Capros aper*); the "Dragonet" (*Callionymus*); a sculpin, the "Father-Lasher" (*Cottus bubalis*); and two flat-fishes (*Pleuronectes limanda* and *P. microcephalus*). The author himself admits a doubt about this.

So far as I know the European Eel (*Anguilla vulgaris*) is the only fish which has its spawning grounds off the American coast and the non-pelagic stages occurring in northern and western Europe, and in the Mediterranean, only; but in this case the locality is the Sargasso Sea, off the Bermudas, not in northern waters, as found recently by the Danish *Dana* Expedition.

To the records and descriptions of the eggs and larvæ Dr. Dannevig has added two interesting chapters containing a general discussion of their distribution and the biological conditions affecting it.

Next comes a long memoir by another Norwegian, Dr. Einar Lea, about the age and growth of herring in Canadian waters, based mainly upon a careful examination of their scales, and well illustrated.

Follows then an illustrated report upon the marine Copepods collected during the cruises in 1915, by Prof. A. Willey of McGill University, Montreal. As is well known, these minute Crustaceans occur in enormous masses, particularly in northern and arctic seas, and form the main item in the food of such pelagic fishes as the herring and young stages of many other fishes. Furthermore they are of great importance for the study of oceanographic conditions, because they are completely dependent upon the currents of the sea, and certain species occur only in very cold water, others again only in warm water, and others are characteristic for temperate regions.

Another Canadian, Dr. A. G. Huntsman, of Toronto, contributes a memoir, discussing the microscopic, pelagic life (Plankton) in general, with a very interesting chapter about the peculiar Chætognaths ("Arrow-worms") in particular, showing their distribution in Canadian waters and the factors deciding this. It will be recalled from the review of "Contributions to Canadian Biology" in *The Canadian Field-Naturalist* for November, 1922, p. 159, that the 1918-20 volume contains two reports by the same author upon the pelagic worms and Tunicates (*Salpæ*) secured by this same expedition, and their distribution.

A shorter report upon the pelagic, microscopic, primitive animals and plants (Protozoa and Diatoma) collected during the expedition, from the pen of Prof. H. H. Gran of Christiania, is also found in Dr. Hjort's book.

Another Norwegian, Dr. P. Bjerkan, of Bergen, has a memoir about the hydrographic (oceanographic) investigations made during the cruises, showing the instruments used and the results obtained as to salinity, temperatures, etc.

Finally Dr. W. I. Sandstroem, of Sweden, contributes a voluminous, well-illustrated memoir, entitled the Hydrodynamics of Canadian Atlantic Waters, a study based upon the hydrographic observations made during the expedition, and upon the work carried on for years in Canadian waters by the Department of Marine and Fisheries in Ottawa, particularly the Tidal and Current Survey.

The volume is without question one of the most valuable and extensive "reports" referring to marine investigations published by Canada; and it reflects great credit upon the Dominion Government that in spite of the fact that the leader of the expedition, Dr. Hjort, had to return to Norway when the field-work was over, and that most of the reports were written in Europe, it has been possible to secure these reports and to have them published in Ottawa in so perfect a shape as is the case. For this Prof. Prince, who was the editor, and who had all the trouble with the proofs during submarine warfare, etc., has the main credit.

The book may be had on application to the Department of Marine and Fisheries, Ottawa.—F. J.

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NOTES ON THE BIRDS OF GRAND MANAN, NEW BRUNSWICK

By CHARLES W. TOWNSEND

THE Island of Grand Manan, lying in the Bay of Fundy some ten miles off the shore of northern Maine and southern New Brunswick, is about twenty miles long and from four to seven miles broad. Its western coast line is nearly straight and is bordered by cliffs of igneous rock from two to four hundred feet in height. The eastern coast, whose rocks are classed as of metamorphic pre-Cambrian origin, slopes gently to the shore and has a broken outline with many bays and harbors and some salt marshes. On this side, also, are many islands of greater and lesser extent. A road runs along the eastern shore, bordered by farms, and passes through five small villages whose chief industry is fishing. The rest and major part of the island is forested, formerly with spruce and fir, but now, owing to frequent fires and the use of the axe, the character of the region has changed and the trees are largely canoe birch and aspen with a sprinkling or occasional tract of spruce and fir. The spruce of any size that remains is being rapidly cut out. White, red and black spruce are all to be found, the white and red being the most common. Arbor vitæ and larches are also common and there are a few white pines. I found one red pine. Besides the aspen and canoe birch, there are gray and yellow birches, beech, sugar and striped and mountain maples and mountain ash. There are also a very few red oaks. Sphagnum bogs, partly grown up to Labrador tea, rhodora and other shrubs, as well as extensive alder swamps are common.

It is evident that with the change in the character of the country and of the flora and with the growth in population, a considerable change must have taken place in the avifauna, and we are fortunate in having records by competent observers in times past. In 1833, before starting on his famous Labrador trip, Audubon visited Grand Manan. In 1856 Dr. Henry Bryant[1] and Mr. J. E. Cabot, studied the birds of Grand Manan, and in 1871 and 1872, Mr. Harold Herrick[2] visited the island for the same purpose. In 1891 Messrs. A. C. Bent and Owen Durfee visited the island and Mr. Bent has kindly given me his notes on the birds. My own studies of the island were made during the months of July and August, 1923. It will thus be seen that there have been five ornithological investigations of Grand Manan at nearly equal intervals during the last ninety years and it will be interesting to compare the various records.

With an increasing human population long accustomed to egging and shooting, one would expect here as in other places along the coast, a diminution both in number of species and in number of individuals of water-birds, and this is indeed the case. But with the same beneficial migratory bird laws, both in Canada and the United States, the lowest point has undoubtedly been passed and the prospects for the future are bright. It is difficult, however, to make a people, independent in their isolation and accustomed to consider egging and spring shooting as their rights for generations, to give up these practices. All ornithologists are greatly indebted to Mr. Robie Tufts, chief migratory bird officer for the Maritime Provinces, for the tactful and efficient manner in which he is seeing to it that these laws shall be enforced.

The water-bird that at the present time and in the past has nested in largest numbers at Grand Manan is doubtless the Herring Gull. Audubon found them nesting in immense numbers and was surprised to find some of them nesting in trees, due, as he was assured, to persecution by man. Bryant does not give any estimate of the numbers of this Gull but says that "the favorite breeding-places of this bird, at Manan and the neighboring islands, were the heaths, as they are called by the inhabitants—dry, peaty bogs, covered with coarse grass, scattered bushes and dwarf firs." Herrick says that the nesting places of sea-birds on the outlying islands of Grand Manan "are being gradually broken up, and the persecuted birds are either retiring farther north, or are betaking themselves to the inaccessible cliffs where they can not be molested." He describes the extensive nursery of Herring Gulls on the

[1] *Transactions of Boston Society of Natural History*, January 21, 1857.

[2] "*A Partial Catalogue of the Birds of Grand Manan.*" *Bulletin of Essex Institute*, Vol. V, Nos. 2 and 3, 1873.

cliffs of Southern Head, where the cliffs, some two hundred feet high, afford countless nesting places on the tops of the basaltic columns of which they are composed. He goes on to say: "The present inhabitants of the island can remember when it was an easy thing to go out and collect four or five hundred eggs in an afternoon; but, alas those times are no more and unless something is done, and that soon, to prevent the promiscuous destruction of these useful birds, gulls' egging at Grand Menan will be among the things of the past."

At the present day, with the possible exception of two pairs at Southern Head, no Herring Gulls nest on the main island of Grand Manan. It is estimated that some fifteen thousand pairs nest on Outer Wood Island, two thousand on Inner Wood Island, forty pairs on Green Island and twenty on White Horse. A considerable number nest on each of the Three Islands.

But man has not been the only enemy in driving away the Herring Gull and other sea-birds from the main island of Grand Manan. Red foxes were brought to the island in 1874, and, according to Mr. Ernest Joy of Wood Island, these exterminated, by 1883, the Gulls that nested on Gull Heath, at Southern Head. Incidentally, it may be remarked that the foxes exterminated the varying hares which were introduced about 1850 and which were described by Herrick as existing, in 1871 and 1872, in "thousands" in the heaths of the island. Later the foxes to the number of two thousand were poisoned, out of spite, it is said, and exterminated.

But still another introduced mammal, the racoon, has played havoc with the Gulls, for this creature, introduced about 1905, it is said, climbed the cliffs and robbed and drove away all the nesting Gulls. The racoon is still an inhabitant of the main island and is a serious menace to all nesting sea-birds.

It is probable that in former days the Great Black-backed Gull nested at Grand Manan and this is stated to be the case by Herrick. I saw a few only of this bird and Mr. Joy believes that a pair has recently bred at Green Island.

Bryant found a dozen pairs of Common Terns breeding at Green Island and Herrick said this species bred on the Seal Islands. A few breed on Green Island to-day. At Machias Seal Island, fifteen miles to the southwest, I found a colony of about a thousand breeding Terns, all of which seemed to be Arctic Terns, and there were as many more on an outlying rock.

The earlier ornithologists all found the Eider breeding commonly. Audubon says: "On the 31st of May, 1833, my son and party killed six Eiders on the island of Grand Manan off the Bay of Fundy where the birds were seen in considerable numbers, and were just beginning to breed." Herrick says: "This is the most common of all ducks, breeding in abundance on all the small islands about Menan, but it is fast decreasing, as not one bird in three raises any progeny, because of the continued depredations of the islanders, who rightly esteem their eggs as a great delicacy, and collect them as fast as laid." Mr. Bent saw about a dozen Eiders and writes in his Journal, "The natives say they are shot at so much that they do not dare to come ashore to breed." Eiders are now nearly gone. I saw only three or four individuals near White Horse and Green Islands.

Of the Black Guillemot, Herrick says: "Common yet, but is doomed to extinction; as are all the sea-birds that still haunt these old breeding places, each spring seeing fewer birds come back to breed than went away in the fall." Fortunately this gloomy prediction has not been fulfilled. The Black Guillemot is the only member of the Auk family that still breeds in the rocky cliffs of Grand Manan Island, but in small numbers compared with those of former times. I generally found twenty or thirty birds near the Bishop's Rock at the northern extremity of Grand Manan and a few scattering pairs at various places along the westerly and southerly shore. It is probable that as long as the racoon flourishes on the main island, nesting Black Guillemots will have a hard struggle for existence, but on the outlying islands, where this mammal is not found, there is no reason why this bird should not increase in numbers. At Outer Wood Island I found them nesting in many hundreds, if not thousands, laying their eggs in clefts in the rocky cliffs. Groups of fifteen or twenty birds sat about on the rocks and allowed close approach, and hundreds were to be seen on the water. On July 30 a few eggs were found, but most of the eggs had hatched and some of the young were fairly well grown. None, however, were seen in the water at this date.

The Razor-billed Auk is described by Herrick as "still common about the Murre Rocks and Seal Islands, where it breeds without much molestation." Mr. Bent found about a dozen at Murre Rocks. On August 2, on a trip to Gannet Rock, five miles south of Outer Wood Island and about a mile to the east of the Murre Rocks, I saw two of these birds. Mr. Ernest Joy reported that some three hundred breed on the southernmost of these rocks, and that they are seldom disturbed except, possibly, by Indians who visit the rocks to shoot seals.

No Murres breed to-day in these regions and none were found by either Bryant or Herrick. Bryant saw one Puffin near Grand Manan.

Puffins still breed to the number of five or six hundred at Machias Seal Island, where I found them well protected. Their eggs are laid, not in burrows in the ground as is generally the case, but under great blocks of granite thrown up by the waves and forming a sea wall. Here they are safe from man.

Herrick says that Gannets "used to breed on the 'Gannet Rock', but since the lighthouse has been built, the Gannets have left." This was lighted for the first time in 1831.

Leach's Petrel was found by the earlier ornithologists breeding on the smaller islands in doubtless the same numbers as occur there to-day, for there it has few enemies to contend with and man is satisfied to leave it alone, except when impelled by curiosity to explore its burrows. My own studies[1] of this bird were made at Outer Wood Island during my visit of six days at the Life Saving Station. On the outer side of this island it breeds in the soft, peaty soil to the number of many hundreds. According to Mr. Joy it also breeds at Green, White Horse and Kent's Islands.

So much for this brief review of the water-birds in past and present times. As already suggested, the changes in the character of the forest brought about by fire and the axe and the extension of cultivated and pasture lands and the increase in human habitations would lead us to expect a change in the land-birds, and this is the case. Certain birds of the Canadian Zone have become less common and more restricted in their range on the island, while certain birds of the Transition Zone have increased. Thus the White-throated Sparrow, found commonly by both Bryant and Herrick, had, by 1923, largely deserted the fields and gardens near the houses, although it was abundant elsewhere on the island. Neither the Song nor the Chipping Sparrow was found by Bryant, while Herrick makes no mention of the Chipping Sparrow and calls the Song Sparrow "rather uncommon." He says he "took but one nest and three or four birds." Mr. Bent records both of these species. In 1923 Chipping Sparrows were common about the houses and in the roads of the villages, while Song Sparrows were abundant there and in the bushy fields and pastures.

Both Bryant and Herrick speak of the abundance of the Black-poll Warbler, and the latter calls it "the most common Warbler." With the cutting of the spruce forests and their replacement by hardwoods this Warbler has diminished in numbers and I found it one of the more uncommon Warblers. On some of the islands, like the Wood Islands, Long Island and Nantucket Island, where there are still extensive stands of spruce, this bird is common. The Yellow Warbler and the Oven-bird were not found by Bryant and he found but one pair of the Chestnut-sided Warbler. All three were called rare by Herrick while all three are now common. The Yellow Warbler is especially common in the bushes and gardens about the houses. The Winter Wren, although not uncommon to-day, is probably less abundant than in the days before the sun was let into its dark forest retreats.

I have added three birds to the list of the birds of Grand Manan, as follows:

Buteo platypterus, BROAD-WINGED HAWK.—One seen on August 16 and again on August 17 at North Head.

Molothrus ater, COWBIRD.—An adult male seen on August 7 at North Head.

Chondestes g. grammacus, LARK SPARROW.—On August 13, I saw one of these accidental wanderers from the Middle West feeding on the outskirts of the village of North Head. I was familiar with the bird, having previously met with it three times in Massachusetts. Its identification was confirmed after I had procured my collecting gun and shot it. It proved to be a juvenal male and it is now in the Victoria Memorial Museum at Ottawa. Three days later, on August 16, on the same road, about half a mile away, near Whale Cove, I saw two more of these birds feeding in the road. My attention was attracted to them by the quick way in which they hopped about with heads and necks stretched up, and by their face markings and by the distribution of white in their tails. They both appeared to be immature and all three were perhaps a family group that had wandered to the East and were migrating southward with eastern birds.[1]

Grand Manan is fortunate in having among its inhabitants such a keen observer and collector, as well as such a skilled taxidermist, as Mr. Allen L. Moses of North Head. I had many opportunities for examining his splendid collection of mounted birds. Among these I found the following that should be recorded, and, with Mr. Moses' permission, I have entered them here:

Larus hyperboreus. GLAUCOUS GULL. December 15, 1912.

L. leucopterus. ICELAND GULL. March 1, 1906.

L. kumlieni. KUMLIEN'S GULL. February 10, 1916.

Phalacrocorax carbo. CORMORANT. February 1, 1923.

Chen hyperboreus nivalis. GREATER SNOW GOOSE. October 6, 1912.

Rallus virginianus. VIRGINIA RAIL and nest of eight eggs. June 3, 1908.

[1] *Auk*, Vol. XLI, 1924.

[1] *Auk*, Vol. XLI, 1924.

Aquila crysaetos. GOLDEN EAGLE. October 1, 1905 and October 1, 1915.

Otocoris alpestris praticola. PRAIRIE HORNED LARK, ♂ and ♀. March 16, 1908.

Sturnella m. magna. MEADOWLARK. October 23, 1900.

Hesperiphona v. vespertina. EVENING GROSBEAK. February 26, 1913.

Calcarius ornatus. CHESTNUT-COLLARED LONGSPUR. June 2, 1914.

Passerina cyanea. INDIGO BUNTING. April 18, 1912.

Calamospiza melanocorys. LARK BUNTING. August 15, 1910.

Bombycilla garrula. BOHEMIAN WAXWING. December 5, 1908.

Mimus p. polyglottos. MOCKINGBIRD. October 15, 1911.

ROCK-BORERS AND TIDE-POOLS

By IRA E. CORNWALL, F.G.S.

IN a paper published in *The Canadian Field-Naturalist* of last October[1], reference was made to the work of the rock-borers in the sandstone, or conglomerate, of the Sooke formation, Southern Vancouver Island. The area referred to is about a third of a mile west of the mouth of Muir Creek, where the coast has been cut back, forming cliffs which face the Straits of Juan de Fuca. The cutting back of the coast has left a rock platform, or beach, which extends from the base of the cliffs out beyond low tide mark. There are many tide-pools in the lower part of this beach, and their rapid growth has been watched for several years with considerable interest, as it shows how certain table-like projections have been formed at different parts of the beach. At first sight these projections appear to have been formed by wave action, but an examination of those which are uncovered only when there is a zero tide shows that their sides are honeycombed by borings of the rock boring Pelecypod *Pholas penita,* also by the much larger caves cut by the sea-urchins. It is very probable that these two borers are mainly responsible for the rapid growth of the pools, and the extending of the pools till their walls are cut through, combined with wave action, has formed the table-like projections, although wave action does not seem to be very rapid where the pools have been formed, as chisel marks are still to be seen where several fossil bones were cut out of the conglomerate four years ago.

The rock forming the beach has been cut by numerous faults, and where narrow openings have been formed by this faulting, calcite has been deposited. The cutting back of the cliffs has exposed these veins, and as they are softer than the surrounding rock they have been cut out by wave action, leaving narrow openings. This was evidently the way in which many of the tide-pools were started. Others may have originated by the wearing down of softer areas of the rock.

The *Pholades* are free swimming when young and apparently cannot live where they are uncovered by the tide, therefore only those would survive that settled down below low tide mark, or in openings which would hold water when the tide was out. They bore in horizontally, undercutting the surface; when this gives way, an opening is formed in which the sea-urchins can find protection from the waves while they begin cutting their caves. Several places were examined last year where this had taken place, but an examination of the same area this year shows that there are now tide-pools of considerable extent, where before there were only narrow openings.

East of Glacier Point, or, as it is locally known, Point-no-Point, there are the remains of a tide-pool which show one phase of the process of beach-table formation. This pool was at a slightly greater elevation than that of the pools near Muir Creek. The seaward wall has been broken through and owing to the elevation of the pool it is drained at low tide. There is more sand and gravel at this place than at the Muir Creek pools, and wave action has eroded the sides to such an extent that the *Pholas* borings are partly obliterated. When this is accomplished it will have every appearance of a wave-cut channel.

The sides and bottoms of the pools near Muir Creek are completely honeycombed by the borings of the sea-urchins, which are frequently so close together that there is only a thin wall between them. In some cases these walls have been cut through, leaving the rock in a very weak condition. A great many of the *Pholades* have been destroyed by the cutting into of their borings by the sea-urchins.

The newly cut tide-pools present a very beautiful appearance, as they are almost free from seaweed, and their bottoms and sides are studded with the purple urchins in their gray rock caves. The surface of the rock surrounding the pools is covered with a dense growth of various green and brown sea-weeds, eel-grass, sponges and corralines. A few large specimens of barnacles, *Balanus*

[1] *The Canadian Field-Naturalist,* Vol. XXXVI, No. 7, p. 121, 1922.

cariosus,[1] were found here in a much lower station than usual on this part of the coast. They are generally found in greatest abundance at the half tide mark.

There are two species of sea-urchins found near Muir Creek, the green urchin, *Strongylocentrotus drobachiensis*, which is comparatively rare there, and *S. purpuratus*, which does the rock boring. The urchins in the borings rarely exceed two and one half inches in diameter, and are dark purple, even the tube-feet being purple. The spines, which are very numerous, have truncated tips, and are finely fluted. The apical plates all bear spines.[2]

The rock cutting of sea-urchins has been variously described as being done with the teeth, by absorption, or with the spines. They are known to cut caves in limestone by constantly turning,[3] and this is evidently the method by which they cut the conglomerate, as they cannot bring their teeth into contact with the walls of the caves. All of those examined were centrally placed in their caves, with the top, or periproct, facing out, and the mouth, or peristome, in against the bottom of the cave. In most cases the urchins were fitted in tightly, and could not be removed without their spines being broken.

The sea-urchin feeds on algæ and other marine growths, which it cuts from the rocks with its five concentrically arranged teeth; it also captures small Crustacea with its tube-feet and pedicellariæ. Anything taken in this way is passed down to its mouth by the tube-feet. It must depend largely on this latter method of feeding when living in a cave, as a careful examination of the interior of several newly cut caves failed to reveal any marine growth, except a few small Serpulæ, which did not seem to have been injured by the urchin.

The sea-urchin has a peculiar habit of apparently trying to conceal itself under pebbles and pieces of sea-weed which it removes from under it with its tube-feet; usually these are held on top near the periproct. This action would remove the loosened material from below it as it excavates its cave, but it must depend on the action of the waves to carry this material away.

During the last few years a large number of *Pholas* borings have been cut open and their contents examined. Many of these were occupied by other species, and nothing remained of the *Pholas* but its shell; in others even the shell was gone. Many of these borings were occupied by *Saxicava pholadis*. One boring contained a *S. pholadis* shell one and one half inches long with a smaller living one inside it. There were also many *Crepidula* in these borings.

There is another rock borer found along this coast which does not seem able to penetrate the Sooke conglomerate, but has taken to living in *Pholas* borings. This is *Adula californiensis*, Philippi,[4] (1847). These shells are about 40 mm. long and 15 mm. in greatest diameter, and are covered with a dark brown epidermis. (It has been listed, and appears in many shell collections under the name *Adula stylina*, Carpenter, 1864.) A large block of conglomerate broken off from below low tide mark was found to be honeycombed by *Pholas* borings, but there was not a single living *Pholas* in it, although the shells were still in some of the borings. In each of these there was an *Adula* shell, in some there were several packed in tightly, but there was not the slightest evidence of their having done any of the rock cutting as all were typical *Pholas* borings with very narrow openings. They, like the other shells found in the borings, must have entered when young and grown there.

The rock borers are causing a large amount of destruction of the sedimentary rocks on this part of the coast, but the rapid changes noted in this small area may be exceptional, and it may be many years before such marked changes are seen again.[5]

[1] *U.S. National Museum Bull.* 93, p. 189, 1920.
[2] *Key to the Echinoderms of Friday Harbor, Wash.*, p. 36., Mildred Bush. Puget Sound Bio. Station.
[3] *The Cambridge Natural History. Echinodermata*, p. 521. 1906
[4] *U.S. National Museum Bull.* 112.
[5] Since the above was written some of the shells from the borings have been returned from the U.S. National Museum where they were sent by Dr. C. F. Newcombe, of Victoria. The rock-borers prove to be of two varieties; *Pholadidea penita*, which is referred to in the paper as *Pholas penita*, and *Pholadidea penita* var. *sagitta* Stearns. The latter is not nearly as common as *P. penita*. There was another shell taken from one of the borings which has rarely been reported from this part of the coast; this was identified as *Kellia laperousei* var. *chironii* Carpr.

BIRD NOTES FROM THE NORTH SHORE OF LAKE SUPERIOR, NEAR GARGANTUA, ALGOMA DISTRICT, ONTARIO

By M. J. MAGEE

THE following observations were made in 1923 near Gargantua, Ontario, about 75 miles north of Sault Ste. Marie.

August 15. A pair of Crested Flycatchers, same place where found a pair August 15-17-18 in 1921.

August 4. Two Connecticut Warblers, near same place where I found two old birds feeding one young on August 17, 1918.

August 9. Five Hudsonian Chickadees. The first time I have ever found them up the North Shore.

August 4. A pair of Ruby-crowned Kinglets feeding two young. This is the fourth time I have found Ruby-crowned Kinglets feeding young early in August at points up the North Shore. In 1914 on Caribou Island, some 35 miles westerly from Gargantua, two pair feeding young; in 1917 at Batchawana Bay, about 35 miles north of Sault Ste. Marie, old bird feeding young just out of the nest; in 1919 at Beaty's Cove, near Gargantua, a pair feeding three young.

The Warblers were all flocked and heading south, and were almost invariably accompanied by a few Black-capped Chickadees. In fact, for many years whenever a Chickadee was heard it was a signal for every one in camp to turn out and look for Warblers.

The following is a list of the other birds seen on the North Shore this year, August 2 to 18.

PIED-BILLED GREBE, 15.—2 old birds, remainder young.

LOON.—Tolerably common, old and young.

HERRING GULL.—Abundant, nest at many points. All young out of nests, found only one young not able to fly.

AMERICAN MERGANSER.—Common, old and young.

BLACK DUCK, 5.

GREAT BLUE HERON.—Common.

LESSER YELLOW-LEGS, 6.

SOLITARY SANDPIPER, 3.

SPOTTED SANDPIPER.—Tolerably common.

RUFFED GROUSE.—Abundant, saw more than 200 in one day.

MARSH HAWK, 1.

SHARP-SHINNED HAWK. 2.

BALD EAGLE, 4.

OSPREY, 6.

BELTED KINGFISHER, 5.

DOWNY WOODPECKER.—Common.

PILEATED WOODPECKER, 2.

FLICKER, 10.

CHIMNEY SWIFT, 2.

KINGBIRD, 4.

WOOD PEWEE, 8.

YELLOW-BELLIED FLYCATCHER, 3.

LEAST FLYCATCHER, 10.

RAVEN, 7.

CROW, 3.

WHITE-THROATED SPARROW.—Abundant.

SLATE-COLORED JUNCO.—Common, but not as plentiful as usual.

SONG SPARROW.—Tolerably common in suitable places.

TREE SWALLOW, 6.

CEDAR WAXWING.—Common.

BLACK AND WHITE WARBLER.—Tolerably common.

NASHVILLE WARBLER, 8.

TENNESSEE WARBLER, 6.

BLACK-THROATED BLUE WARBLER, 2.

MYRTLE WARBLER.—Abundant.

MAGNOLIA WARBLER.—Common.

BAY-BREASTED WARBLER, 3.

BLACKBURNIAN WARBLER, 6.

BLACK-THROATED GREEN WARBLER.—Common.

PALM WARBLER, 2.

WILSON'S WARBLER.—Tolerably common.

CANADIAN WARBLER.—Tolerably common.

REDSTART.—Common.

HOUSE WREN, 5.

WINTER WREN, 1.

BROWN CREEPER, 1.

RED-BREASTED NUTHATCH.—Common.

HERMIT THRUSH, 5.

ROBIN, 1.

REGIONAL VARIATION OF THE FOUR-SPINED STICKLEBACK, Apeltes quadracus MITCHILL

By PHILIP COX, Ph.D.

THIS little member of the Gasterosteidæ is not uncommon along the North Atlantic coast from Labrador to New Jersey. It is seldom taken in the open sea, but is locally abundant in lagoons, tidal pools, and about the mouths of streams flowing into creeks along the coast. It is frequently found also in the estuaries of rivers, even in their upper parts, where, at low water, they must be practically fresh, and where it is associated with other species of the family, such as the Two-spined Stickleback *G. bispinosus*, the Nine-spined, *P. pungitius*, and with the partially armoured form, *G. gladiunculus*.

It differs from the ordinary stickleback in the absence of the pelvic plate formed by the union of the innominate bones and in the presence of 3 free spines in the first dorsal fin, the 4th being joined to the 2nd dorsal. In the Bay of Fundy region, including both the New Brunswick and Nova Scotia littoral, along the Atlantic coast of the latter province, in Cape Breton, and in the lagoons of the Magdalen Islands, little or no variation is met with, nor has any deviation from the specific type been reported in the southern portion of its range along the New England coast; but in the western portion of the Gulf of St.

Lawrence, especially in the Miramichi Bay, it is otherwise. Here, about three-fourths of the stock have *4* free spines instead of *3*, so the fish are really *5*-spined Sticklebacks.

The following data from many stations will make this fact very evident.

PLACE	No. IN HAUL	No. WITH 4 FREE SPINES	% 4 FREE SPINES
Passamaquoddy	16	2	12
Passamaquoddy	33	0	0
St. Margaret Bay	65	1	1½
Shubenacadie	5	0	0
Newfoundland	3	0	0
Sambro Basin	129	6	4½
Barrington Passage	269	32	12
Magdalen Islands	48	3	7
Miramichi Bay	4	3	75
Napan estuary	32	18	56
Point au Car	21	13	62
Bay du Vin estuary	8	5	62
Fox Island	6	0	0
Portage Island	23	10	43
Miramichi estuary	24	19	79
" "	3	3	100
" "	187	105	56
" "	7	5	71
" "	31	21	68
" "	30	23	76
Kennebecasis	16	2	12

Referring to the records of hauls in the Miramichi region, one observes that the percentage of fish with 4 free spines is greater in the upper and fresher portion of the estuary and at or about the mouths of the Napan and Bay du Vin Rivers, which empty into the lower part of the bay itself, while the lowest percentage occurs at the Fox and Portage Islands, where the salinity is the highest. In Passamaquoddy and St. Mary Bays, and at Sambro, the salinity is nearly that of the ocean, and few, if any, variants are met with. In the estuary of the Kennebecasis, on the other hand, the salinity and temperature are low, and 12% of the fish have 4 free spines. In the lagoons of the Magdalen Islands in the Gulf, the variants are also few, but more than in the Passamaquoddy and St. Mary Bays.

A general survey of the data would seem to suggest that the variation is connected with a low salinity and a high summer temperature, for the Miramichi Bay and the estuaries of the rivers flowing into it have a higher summer temperature than any of the other places mentioned above, while the salinity is generally much less. However, if these be the determining physical factors in the biological process, the same variation would be likely to be seen in its southern range, especially in New Jersey; but the fact, if fact it be, does not seem to have been observed there.

It is not a feature due to growth, age, nor size; the young share in the variation equally with the old; nor does the extra spine seem to be due to a response of the system to a need for increased protection for a larger or longer body, for no difference in this respect is seen between the 4 and 5 spined specimens.

Apeltes quadracus is a local fish, and does not seem to perform any considerable migration. Local and peculiar influences are then more effective than they would be on widely ranging species. The flat-fishes of the Miramichi bay are also affected by the same influences, but in a way apparently the very opposite—namely, in the *reduction* of the fin rays. The writer discussed this matter some years ago, and showed that in the case of the Winter Flounder, *Pleuronectes americanus*, the Smooth Flounder, *L. putnami*, the Sand Dab, *L. ferruginea*, and the Window Pane, *L. maculata*, there was, in the western portion of the Gulf of St. Lawrence, a general reduction in the munber of the dorsal and anal rays compared with that of the same species along the Atlantic coast generally. (Vide *Proc. Mir. Nat. Hist. Assoc.* No. III, pp. 42-7, Chatham, N.B., 1903.)

It might prove interesting to pursue the study in the case of other comparatively stationary species, inhabiting areas of high summer temperature and low salinity, such as the Killifish, the Smelt, the Striped Bass, and even the Greenland Sculpin.

A NEW STICKLEBACK FROM THE WEST COAST OF NEWFOUNDLAND

By PHILIP COX, Ph.D.

LOCALITY: Surface in Westbay, Port au Port Bay, Nfld., September 2, 1922.

A stickleback of the group of partially armoured fish, akin to *Gasterosteus cuvieri* on the one hand, and *G. Wheatlandi* (*G. gladiunculus*) on the other.

Gasterosteus bispinosus subsp. *Johanseni* Cox.

Total length 52 mm.; to last vertebra 45 mm. Head 3½, depth 4. Eye in head 3½; in snout 1; D: 11-1-8; A: 1-6; lateral plates 6-6.

Body deep, compressed; caudal peduncle short, unkeeled. Pelvic plate short, not nearly to

vent, uncarinated.

Dorsal spines moderate, finely serrate on lower half; the first, when depressed, not reaching base of second; nor the second the base of the third.

Ventrals 1-2; spines stout, not reaching end of pelvic plate, serrulate, each with a *long, curved tooth* at the outer side of its base, about one third length of spine.

Colour: Upper and lateral surfaces dark bluish; lower parts pale, perhaps white in life.

Named for its discoverer, Mr. Frits Johansen, Marine and Fisheries, Ottawa, Canada.

It is to be regretted that only one example of this type was taken at the time; nor do I find another among the very considerable collection of sticklebacks made by Mr. Johansen in the Gulf of St. Lawrence and Newfoundland this summer (1922).

There is then, room to regard it as a freak; but as the long, curved tooth at the upper (outer) side of the base of the ventral spine was exactly the same on both spines; and as the proportions of body, head and eye, as well as other features, showed a divergence from the fish of the neighbouring waters, I am inclined to believe it represents at least a race. Unfortunately I accidentally injured one tooth, but it was the counterpart of the one on the other side.

THE NECESSITY FOR VERMIN CONTROL ON BIRD SANCTUARIES

By J. A. MUNRO

THE term "bird sanctuary" is commonly used to describe any area of land or water where the shooting or molestation of birds, or the taking or destruction of their nests or eggs is prohibited by law, and it is generally assumed that the prohibition of shooting on such areas, with the preservation of nesting sites and feeding grounds, will result in an increase of the useful species of birds for whose benefit such reserves are made. That this actually takes place is open to doubt, because, a bird reserve, while giving protection to useful species against the aggressions of mankind, is at the same time attracting, protecting and fostering the increase of more deadly enemies—predacious birds and mammals. Our bird reserves, therefore, cannot be real sanctuaries so long as vermin are allowed to congregate thereon. This passive method of bird protection was tried and found wanting by the late Mr. Wm. Brewster on his farm in Massachusetts. Of this experiment Mr. H. W. Henshaw in a recent number of *The Auk* writes as follows:

"For twenty years no gun was ever fired on October Farm, nor a bird or mammal ever molested by man. Hawks, crows, bluejays, skunks, foxes and other birds and beasties, if not equally welcome in Brewster's eyes, were never molested. Each lived its own life according to its instincts, and Nature was allowed to work her own problem in her own way. Beyond providing boxes for the hole-building species to nest in and planting seed plants for their sustenance, Brewster interfered with them not at all.

"The results will surprise many. They certainly surprised Brewster. For, at the expiration of some twenty years, there were apparently as many birds on the place as there were at the beginning of the experiment, *but no more.* True, there have been changes in the distribution of the species, since the brushy haunts of the warblers and vireos had grown up, and the shrubbery loving species had shifted their quarters elsewhere. But the number of partridges, for instance, had not increased over the original eight or ten, although each year they nested and reared most, if not all, their young. For many years also a pair of great crested flycatchers nested in the cavity of a certain apple tree and every year brought out a brood of young. Nevertheless only one pair came back each spring, and he was unable to find any in the surrounding territory. So it was with other species. Brewster's explanation in the case of the partridges was that the old birds, with the authority of vested rights, drove away the younger ones, which, had they been allowed to remain, would have overstocked the place according to their own formula. But he found that this experiment proved that to increase the number of small birds in a given area one must at least do police duty and destroy the predacious birds and mammals, large and small. And this he pointed out had been the experience on the large game estates of England and Scotland, where no small part of the keeper's business is to keep down the vermin."

Advocates of the passive method of protection insist that nature should be left entirely alone in order that she may adjust her "balance" to the various disturbing complications of modern civilization. They believe that the Accipiters, the Crow, the squirrel, and so forth, are necessary to this end.

But others feel that "the balance of nature" is not such a delicate mechanism that it cannot be artificially adjusted to meet our requirements. Surely, they argue, this "balance" has had much severe handling aforetime, for man's history since emerging from barbarism has been a conspiracy against nature, and the present stage of civilization has been reached not as a result of natural laws but in spite of them.

Certainly at one time, not so long ago, the Accipiters, the Crow, the squirrel and other outlaws were necessary, in order that the species

upon which they prey might not unduly increase and that the weaklings and the diseased might not live to propagate their kind. But modern civilization has provided substitutes for these natural checks, in the deadly telephone wire, the plate glass window, oil seepage and the lighthouse, to mention only a few of the artificial agents of destruction which may not be controlled.

On many game-farms, where young pheasants are reared in the open, a constant warfare against vermin is absolutely imperative if the business is to be a success—the ideal bird sanctuary of the future will be a game farm on a more extensive scale.

Bird sanctuaries may become the greatest factor in keeping up the supply of the species of birds useful to man. They must, however, be made more productive than they are under natural conditions; they must be made reasonably safe from breeding birds and become actually "bird-farms", under the care of wardens whose chief duty will be the destruction of the predacious birds and mammals which, if left to multiply, will inevitably consume a large percentage of the annual increase.

EDITORIAL—Bird Sanctuaries

NO small portion of certain periodicals which have chiefly to do with wild life, or with hunting, is given up nowadays to demands for the stern repression, or even the utter extermination, of more or less predacious species of birds and mammals, such as some of the Hawks and Owls, foxes, squirrels, and weasels, which such demands term collectively "vermin". The cause of these outcries is said by their authors to be the destruction of "useful" birds and animals by the "vermin". An article of this character, although restricted in its immediate application to areas set aside as bird sanctuaries, appears in this issue of *The Naturalist* from the pen of J. A. Munro. In this paper a bird sanctuary is compared to a pheasant farm, and we are told that "the ideal bird sanctuary of the future will be a game farm on a more extensive scale."

We believe that we ought not to publish this paper without expressing at the same time marked dissent from its premises and its conclusions.

To set up an arbitrary distinction between certain birds as "useful" and others as "vermin" is to beg the question. Having regard solely to the usefulness of birds to mankind, it may be said that any species of bird is useful in so far as it produces satisfaction. For many people there is quite as much satisfaction to be derived from seeing and being acquainted with a Great Horned Owl as from seeing and being acquainted with a Ruffed Grouse, and a great deal more satisfaction than could be obtained by killing and eating the Grouse. Therefore the Owl, as well as the Grouse, is useful to mankind. Each species of bird is of service also to other forms of life beside man, and there seems to be no reason why such usefulness should not be taken into account. It is fair to conclude that all birds are useful in their native haunts, when in the exercise of their normal functions.

This being the case, it follows that, generally speaking, bird sanctuaries should be established and maintained for the benefit of all birds occurring naturally in them. The exceptions will consist of sanctuaries created for the aid of species which are temporarily so diminished in numbers that they cannot retain a position in nature without artificial assistance. In most sanctuaries birds need be protected only against man and unnatural enemies for which he is responsible, such as, in North America, domestic cats, "English" Sparrows, and a civilization-created surplus of native predators.

The establishment of sanctuaries should not be expected to result in the abnormal increase of this species or that. Bird sanctuaries or reservations, properly so called, are for the preservation of natural and naturally-proportioned systems of bird life, for the pleasure and satisfaction of all concerned, mankind included. They should be so distributed that their benefits may be generally felt.

As for the question of man's having the power to alter "the balance of nature" in favor of a certain species or group of species, there is no doubt that he has that power, and that he must exercise it—in suitable places. The result of exercise of that power is like a vegetable garden, from which species other than potatoes, carrots, cabbages, and other edible plants are excluded. Vegetable gardens minister to physical needs and are useful in their proper places, but for them to occupy the entire earth would be very undesirable. They cannot perform the functions of those scenes of natural, unaltered beauty, which are provided by mountain and by forest, by prairie and by sea, and which, since they minister to our aesthetic needs, are appreciated by every normal human being. The further the human race goes forward, the greater the real satisfaction which it obtains through the fulfilment of its aesthetic requirements. Bird sanctuaries, wherein man has refrained from altering the balance of nature and has interfered

only when necessary to maintain that balance, and wherein his desire for the presence and companionship of natural wild life, including bird life, may be satisfied, are sorely needed to-day and will be needed even more and more in the future, if true life is not to be sacrificed to mere materialism.

Bird sanctuaries and game farms are not one, neither can one take the place of the other, and there is no reason why they should be confused. If it is found desirable to maintain game farms, or insectivorous-bird "farms", whereon certain species of birds are to be artificially favored, they should be known as such, just as poultry farms are known as poultry farms. But it is highly important that bird sanctuaries, available to all our native birds, should have their separate and distinct existence.

A NOTE ON THE MONARCH OR MILKWEED BUTTERFLY WITH SPECIAL REFERENCE TO ITS MIGRATORY HABITS

By C. B. HUTCHINGS

ONE of our commonest and most beautiful butterflies is the Monarch, *Anosia plexippus* Linn. It may often be seen throughout the summer months flitting gracefully from flower to flower as it wings its way over the gardens and fields in search of food. These insects arrive from the South in early summer and deposit their eggs on the common milkweed, *Asclepias syriaca*. The eggs hatch into tiny, yellow, black-banded caterpillars which feed upon the leaves of the plant. On maturing the larva suspends itself head downwards from a branch and transforms into a beautiful, light-green, gold spotted chrysalis; described by one naturalist as "the house with the golden nails." From this bejewelled, earring-like object there emerges, about a fortnight later, a bright red butterfly with broad borders and veins of black. Towards the end of August the adults begin to congregate in large numbers just prior to their departure southwards on their migratory flight.



Monarch Butterflies Clustered

One of these rendezvous or collecting spots I had the good fortune to come upon during this past summer. It happened that on the afternoon of August 24th, while attending the Toronto Exhibition, I observed a large number of milkweed butterflies gathered in a thick mass high up on some maple trees on the Fair Grounds near the Horticultural Building. They were so numerous and clustered so heavily on the branches that the effect was to impart a bright red tint to the leaves. As they rested there with folded wings, the trees would sway from time to time in the wind causing large numbers to loose their hold and fall off into the air where they performed graceful evolutions in their endeavour to regain their lost positions. For two days they rested there in the same spot, but on the morning of the third day they had gone. On making inquiry I was told that a large swarm had been seen crossing the lake. Probably they had risen in a body early that day and made off over Lake Ontario into New York State on their southerly migration and possibly had joined other large groups there which were southbound too, because just a week after the above-mentioned event, a report came from New York in the form of a special to the *Toronto Mail and Empire* stating that "myriads of milkweed butterflies had been seen that day (Aug. 30th) fluttering through the City drifting more or less with the wind as they winged their flight southward." Mr. William Beebe of the New York Zoological Gardens is reported to have said in this connection: "These butterflies are on their last flight to death. They are hatched all over Canada and Northern United States and when they have finished their life work by laying their eggs they start on a tremendous migration, drifting southeasterly along the sea coast and finally out to sea where they drop exhausted into the water and die by millions. Science has, so far, failed to explain what instinct prompts them to choose death thousands of miles from their breeding grounds. I have seen them," said Mr. Beebe, "as far south as the Galapagos Islands, off Ecuador, South America."

THE BIRDS OF OTTAWA, 1923—Continued

Revised to March 20, 1923

By HOYES LLOYD

81. *Pluvialis dominica dominica* (Muller). GOLDEN PLOVER.—Formerly an abundant migrant now rare. There was an immense flight about September 1, 1885, and no such flight since. I have found no spring dates. There is a specimen dated September 22, 1884, in the White collection, and Creighton Nash shot one at Lochaber, Quebec, on October 15, 1922, which was identified by G. R. White.

82. *Oxyechus vociferus* (Linnæus). KILLDEER.—A common migrant and breeder, arriving early in spring. In 1882 and 1892 it is recorded as rare. I have seen specimens dated as follows in the White collection: April 2, 1884; August 7, 1889; April 18, 1904. C. E. Johnson and C. L. Patch took the eggs for the Museum group near Billing's Bridge on May 19, 1915.

83. *Charadrius semipalmatus* (Bonaparte). SEMIPALMATED PLOVER.—Moderately common fall migrant. A White collection specimen is dated September 23, 1890. More recently Patch and Blakely have noticed it among the migrating shore birds at Britannia and Taverner and Patch found adult birds at the Petrie Islands on August 28, 1918.

Hypothetical.

Ochthodromus wilsonius (Ord.) WILSON'S PLOVER.—Recorded[1] in error and the error corrected[2].

Hypothetical.

Arenaria interpres (Linnæus). TURNSTONE.—This species is included in the 1891 list[3] and in Eifrig's list[4] although he states that he has not met with it. There are no records of its occurrence in the district so far as I am aware.

84. *Canachites canadensis canace* (Linnæus). CANADA SPRUCE PARTRIDGE.—Formerly a common resident which undoubtedly bred, although I have heard of no nests. A few stragglers can be expected near the city yet, and it occurs in more remote parts of the district; e.g., at McGregor's Lake. As recorded by Eifrig, C. H. Young saw one that had been shot near the city about 1910.

85. *Bonasa umbellus togata* (Linnæus). CANADA RUFFED GROUSE.—Common resident, breeds. This grand bird may be found in every suitable patch of woodland near the city. C. E. Johnson located a nest in such a locality, which contained twelve eggs, on May 13, 1920.

Hypothetical.

Lagopus lagopus (Linnæus). WILLOW PTARMIGAN.—This species has not occurred within our district so far as I am aware. It is reported in the 1891 list[5] because of specimens secured at Gracefield, Quebec, and Eifrig[6] mentions it as an extra-limital species.

86. *Ectopistes migratorius* (Linnæus). PASSENGER PIGEON.—Formerly a common summer resident, now extinct. The following list gives some of the later records year by year:

1882. Noted without comment in the list published.[1]

1884. An adult male shot in Cumming's woods on June 6. An adult and juvenal, both females, were shot near McKay's Lake on June 28 (not June 25, as in Eifrig's list). These are in the White collection.

1885. First arrival, a male, seen in the White's garden on May 10[2]. One noted same place on August 25 (not 1884 as in Eifrig's list.)

1886. April 15, twelve seen, and May 24, one seen at McKay's Lake.

1887. One seen in White's garden on August 23, and one seen at Kettle Island on September 3[3].

1888. Observed. No date[4].

The species is given in the 1891 list as rare, probably without sufficient evidence.

87. *Zenaidura macroura carolinensis* (Linnæus). MOURNING DOVE.—This species has come into the Ottawa vicinity recently and is now well established as a summer resident. It is moderately common and breeds. The first occurrence of which I am aware was on August 20, 1903, when one was seen at Shirley's Bay, by E. G. White (cf. Eifrig). By 1908, Eifrig records seeing several[5] and in 1910 he states that a young bird was shot at Dow's swamp, this making the first breeding record[6]. I have been given notes by various observers showing that it occurred in 1911, 1918, 1919, 1920, 1921 and 1922. On July 3, 1919, R. M. Anderson was advised of a nest at Britannia and went out to see it. The bird was brooding two young and allowed a close approach. This was the first nest discovered in the district, I believe.

88. *Elanoides forficatus* (Linnæus). SWALLOW-TAILED KITE.—Accidental, one record. This species is omitted by Eifrig, but after discussing the matter carefully with G. R. White I am satisfied that the single record is authentic. The single occurrence was prior to 1881, and the bird was examined closely with a good telescope. In the original note (*O. F.-N. C. Trans.* 3, p. 32, and *Ibid.* 4, p. 86) we find the following: "One specimen seen by Lieut.-Col. and Mr. Geo. R. White. When observed it was sitting on a flag-staff, at the Rideau Rifle Range. It was, unfortunately, not secured, but it was examined closely through a glass; and, as there is no bird with which it could be confounded, there can be no doubt as to its identity."

89. *Circus hudsonius* (Linnæus). MARSH HAWK.—Common summer resident, breeds. D. Blakely took a set of five eggs for the Museum collection

[1] *O. F.-N. C. Trans.* 3, 1881-82, p. 32.
[2] *O. N.*, V, 1891-92, p. 31.
[3] *O. N.*, V, 1891-92 ,p. 38.
[4] *O. N.*, XXIV, 1910-11, p. 179.
[5] *O. N.*, V, 1891-92, p. 38.
[6] *O. N.*, XXIV, 1910-11, p. 179.

[1] *O. F.-N. C. Trans.* 3, p. 32.
[2] *Ibid.* 7, p. 358.
[3] *O. N.*, II, p. 52.
[4] *O. N.*, II, p. 151.
[5] *O. N.*, XXIV, p. 180.
[6] *loc. cit.*

near Ottawa on June 23, 1916. No. 1185, Victoria Memorial Museum.

90. *Accipiter velox* (Wilson). SHARP-SHINNED HAWK.—Common summer resident, breeds. One was taken by E. G. White on February 21, 1888, but I think this may have been an early migrant rather than a wintering bird. However E. G. White thinks that a few winter and it was recorded in the Christmas census, 1921. In 1888 Mr. White took others on April 24, and 25, and on September 13. W. T. Macoun found it breeding in Dow's swamp prior to 1903[1]. Eifrig found fresh eggs on June 30, 1909, and young birds on July 11, 1904[2]. Johnson and Blakely also report it as nesting, one having been observed feeding young.

91. *Accipiter cooperi* (Bonaparte). COOPER'S HAWK.—Rare summer resident, although I know of no nesting records. Specimens in the White collection are dated April 18, 1885; September 11, 1888; August 29, 1903. Probably many pass through as migrants.

92. *Astur atricapillus atricapillus* (Wilson). GOSHAWK.—Irregular migrant, sometimes common; uncommon resident, breeds. To F. C. Hennessey belongs the honour of adding this as a breeding species to the Ottawa list. He found a nest at Old Chelsea, Quebec., on May 16, 1912, and secured the adult and juvenals. No. 6016-7 Victoria Memorial Museum. Eifrig[3] gives an interesting account of an incursion of these birds which occurred in the fall of 1906. Specimens have been examined.

Eifrig[4] gives the evidence concerning a battle royal between an adult Goshawk and a Barred Owl in which both birds received their death blows, the Owl surviving the Hawk for some time, but finally dying about ten paces from the place of battle, as did the Hawk.

93. *Buteo borealis borealis* (Gmelin). RED-TAILED HAWK.—Moderately common summer resident. Undoubtedly breeds but I know of no specific breeding record.

94. *Buteo lineatus lineatus* (Gmelin). RED-SHOULDERED HAWK.—Moderately common as a migrant, breeds, nest with two eggs found by *O. F.-N. C.* Excursion near Hull, Quebec, on May 22, 1909.[5] Prof. Macoun and C. H. Young took a set of three eggs for the Museum collection near Hull, Quebec, on May 1, 1907. P. A. Taverner found a pair at Kemptville, Ontario, in mid-June 1918. He found the species very common at the Petrie Islands at the end of August and the beginning of September of the same year, and secured specimens there.

Hypothetical.

Buteo swainsoni Bonaparte. SWAINSON'S HAWK. —Recorded in error[6] and error corrected[7].

95. *Buteo platypterus* (Vieillot). BROAD-WINGED HAWK.—Moderately common summer resident, breeds. D. Blakely took a set of 3 eggs for the Museum, May 27, 1918. Specimens in local collections.

96. *Archibuteo lagopus sancti-johannis* (Gmelin). ROUGH-LEGGED HAWK.—Rare migrant, probably irregular. C. H. Young noted it here during the winter 1897-98 and 1899-1900[1]. There are specimens in local collections.

97. *Aquila chrysaetos* (Linnæus). GOLDEN EAGLE.—A casual visitor, probably more regular than the few definite records indicate. One was taken at High Falls, Quebec, on the Liévre, as recorded by Eifrig[2]; another was taken October 30, 1883, at Casselman, Ontario[3]. One was taken at Chelsea, Quebec, in the spring of 1922.

98. *Haliæetus leucocephalus leucocephalus* (Linnæus). BALD EAGLE.—A casual visitor in the district, not as rare as the Golden Eagle. There is an account of a nest discovered at Pêche (Wakefield), Quebec, in May, 1881[4], and Rev. C. J. Young reports the species as breeding on Rideau Lake[5]. A few pairs may still breed in remote sections, but large birds of this kind are seldom left unmolested. Specimens have been taken from time to time and the bird has been seen alive in the city.

99. *Falco islandus* Brunnich. WHITE GYRFALCON.—Accidental, two records. G. R. White once shot a bird of this species, the first to be taken in the district, and probably in Ontario. This bird was given to James Fletcher, and lost by the taxidermist. The occurrence, which is incidentally and erroneously referred to *F. r. gyrfalco* in the 1891 list, *O. N.*, V, p. 39, was known to McIlwraith, who included the White Gyrfalcon in his *Birds of Ontario* in consequence of it. McIlwarith appears to give the wrong date for this capture of the White Gyrfalcon, viz., December 23, 1890. The bird taken this day is still in the White collection and upon examination is found to be *F. r. gyrfalco* Linnæus, in my opinion. This occurrence is duly reported in *O. N.*, V, p. 39.

The second White Gyrfalcon to be taken here was shot at Gatineau Point, Quebec, about twenty years ago, and sent to Henry's to be mounted It has not previously been recorded. The bird was seen in the flesh by E. G. White, who took two photographs of it, and these should serve to confirm the identification, if they can be located.

100. *Falco rusticolus gyrfalco* Linnæus. GYRFALCON.—Accidental, one record. This specimen was taken by E. G. White in the White's garden on December 23, 1890, and is still in the White collection. It is referred to in *O. N.*, V, p. 77 and p. 39, also in Eifrig's list, *O. N.*, XXIV, p. 181. McIlwraith[6] mentions the date in connection with the occurrence of the White Gyrfalcon, which is an error. The specimen has been compared with the plate by Fuertes in *The Birds of New York*, there being no specimens available for comparison. and referred to this sub-species.

101. *Falco peregrinus anatum* Bonaparte. DUCK HAWK.—A rare migrant; has been seen in summer and may breed.

102. *Falco columbarius columbarius* Linnæus. PIGEON HAWK.—A rare migrant and casual winter resident—a few specimens have been taken.

[1] *O. N.*, XVII, p. 26.
[2] *O. N.*, XXIV, p. 180.
[3] *O. N.*, XX, 1906-7, p. 218.
[4] *O. N.*, XXI, 1907-8, p. 97.
[5] *O. N.*, XXIII, 1909-10, p. 79.
[6] *O. N.*, II, p. 49.
[7] *O. N.*, V, p. 31.

[1] *O. N.*, XII, p. 19.
O. N., XIV, p. 22.
[2] *O. N.*, XXIV, p. 181.
[3] *O. N.*, V, p. 39, and *O. F.-N. C. Trans.* 5, 1883-4, p. 143.
[4] *O. F.-N. C. Trans.* 3, p. 27.
[5] *O. N.*, III, p. 28.
[6] *Birds of Ontario*, p. 213, ed. 1894.

103. *Cerchneis sparveria sparveria* (Linnæus). SPARROW HAWK.—Moderately common summer resident; breeds. Patch and Johnson took half-grown nestlings for the Museum collection on July 20, 1917—Nos. 11225-6, Victoria Memorial Museum.

104. *Pandion haliaëtus carolinensis* (Gmelin). OSPREY.—Common migrant; a few breed still, as Taverner saw one near Kemptville on June 18, 1918. At the Petrie Islands he found six at one time on September 9, 1918. One specimen was taken.

105. *Asio wilsonianus* (Lesson). LONG-EARED OWL.—An uncommon migrant—a few specimens have been taken in fall and a single one in summer. This latter was secured by F. A. Saunders on July 7, 1890.[1]

106. *Asio flammeus* (Pontoppidan). SHORT-EARED OWL.—An irregular migrant, not very common. Practically all the local specimens, of which there are a good number, have been taken in fall.

107. *Strix varia varia* Barton. BARRED OWL.—Rare resident; may breed. A few specimens have been taken. For reference to a battle between a bird of this species and a Goshawk, see Goshawk, this list.

108. *Scotiaptex nebulosa nebulosa* (J. R. Forster.) GREAT GRAY OWL.—A rare and irregular winter visitor. The specimen in the White collection was taken on April 3, 1896; Eifrig reports four in the winter of 1906-7[2]; while Patch and Johnson saw one at Constance Bay on October 1, 1917. Two were shot at Tenaga, Que., about the first of December, 1922, and I secured one of them in the flesh. Other reports indicate that there was a considerable flight that winter.

109. *Cryptoglaux funerea richardsoni* (Bonaparte). RICHARDSON'S OWL.—Rare winter resident. Specimens have been taken by the Whites as follows: January 1, 1884; November 29, 1884[3]; December 17, 1903. Eifrig[4] records seeing one in Henry's shop which was said to have been shot here on November 16, 1906. In December, 1922, R. E. DeLury had brought to him a dead bird which had been found in a city yard, and I collected one at Hull, Que., on February 18, 1923. All reports indicate a considerable flight of the species during the fall of 1922.

110. *Cryptoglaux acadica acadica* (Gmelin.) SAW-WHET OWL.—A moderately common resident. Although found throughout the year it is probably not so common in summer as at other seasons. The only positive evidence of breeding is given by Eifrig, who reports the finding of a female on April 11, 1901, in the ovary of which was a fully developed egg. Specimens have been taken as follows: March 9, 1885; July 14, 1885; February 9, 1887; January 18, 1896; October 11, 1920; (Whites) and June 27, 1921 (Blakely) No. 17429, Bay St., Ottawa. The latter is in the juvenile plumage, which lasts but a short time, and near their residence the Whites once took a bird alive which was in this plumage.

111. *Otus asio asio* (Linnæus). SCREECH OWL.—Moderately common resident; breeds. C. E. Johnson tells me he has seen young birds in two separate seasons between Billings' Bridge and the Hog's Back. On June 7, 1922, I found two young ones just able to fly in the possession of boys at Ottawa South. They had secured them on the banks of the Rideau River, in the city limits, and were persuaded to release them there again after I had banded them. There are specimens in the local collections.

112. *Bubo virginianus virginianus* (Gmelin). GREAT HORNED OWL.—A moderately common resident. The periodic migrations of this species appear to have escaped attention at Ottawa, and there is not much evidence of this species breeding as yet. However, G. R. and E. G. White tell me that they knew of a nest in a hemlock near De Rinzy's greenhouse. Taverner saw one bird near Kemptville in mid-July, 1918.

I believe *virginianus* will prove to be the resident sub-species although others doubtless occur. In this connection I saw two captive birds in the spring of 1922, taken in the Ottawa district, which were dark enough to be *heterocnemis*. Further specimens are required before the local relationship between the sub-species can be definitely determined.

113. *Nyctea nyctea* (Linnæus). SNOWY OWL.—Irregular winter resident, many passing farther south when a flight occurs. The greatest of these flights recorded in this district was in the winter of 1901-2. Eifrig says the local taxidermist received some three hundred specimens then. The Whites have taken specimens in 1890, 1902, 1906 and 1911.

114. *Surnia ulula caparoch* (Müller). HAWK OWL.—An uncommon and probably irregular winter resident. There are specimens in the White collection and other captures are given by Eifrig[1]. One in my collection was shot by E. G. White at Stittsville, Ont., on November 6, 1922. F. Napier Smith[2] gives a most interesting account of a pair he found at Lochaber, Que., in May, 1915. He believes that the female had laid her eggs prior to May 24th, and if so this would be the first breeding record for the species in the Ottawa district.

Hypothetical.

Glaucidium passerinum, var., *Californicum*, Ridg. PIGMY OWL.—Recorded in error[3] and the error corrected.[4]

115. *Coccyzus americanus americanus* (Linnæus). YELLOW-BILLED CUCKOO.—A rare summer resident. In 1890 a pair nested in the Whites' garden. This is the only definite breeding record, and the specimen taken on June 27th is the only specimen I have seen from the district (cf. *O.N.*, V, pp. 40 & 78).

116. *Coccyzus erythrophthalmus* (Wilson). BLACK-BILLED CUCKOO.—A moderately common summer resident; breeds. W. T. Macoun[5] states that this species has bred for several years at the Experimental Farm (1903). D. Blakely took nestlings for the Museum collection on June 24, 1907. C. H. Young took nest and two eggs at Meach's

[1] *O.N.*, V, 1891-2, p. 77.
[2] *O.N.*, XX, p. 220.
[3] *O.F.N.C. Trans.*, 6, p. 273.
[4] *O.N.*, XX, 1906-7, p. 220.

[1] *O.N.*, XXIV, p. 183.
[2] *C.F.N.*, XXXVI, pp. 68-71.
[3] *O.F.N.C. Trans.*, 3, p. 32.
[4] *O.N.*, V, p. 31.
[5] *O.N.*, XVII, p. 26.

Lake, Que. (Victoria Memorial Museum No. 859); and W. Anderson took three eggs near Cyrville, Ont., June 3, 1899 (Victoria Memorial Museum No. 630).

117. *Ceryle alcyon* (Linnæus). BELTED KINGFISHER.—Common summer resident; breeds. Patch and Johnson found a nest at Black Rapids on June 5, 1918, which contained seven young on that date.

118. *Dryobates villosus villosus* (Linnæus). HAIRY WOODPECKER.—Fairly common resident; breeds. A considerable migration occurs, spring and fall. C. E. Johnson found a nest containing young on May 24, 1921—the last two left the nest on June 3rd. The sub-species *leucomelas* is given in the 1891 list[1] and in Eifrig[2]. It is possible that it occurs rarely but I have not found it here. Specimens taken by the Whites in 1884 and 1885, and by me in January, May and November, 1920, and in December, 1921, are all referred to this subspecies, *D. v. villosus*.

119. *Dryobates pubescens medianus* (Swainson). DOWNY WOODPECKER.—A common resident, abundant in migrations; breeds. Johnson, Patch, and Young took a nest and 5 eggs for the exhibition group in the Museum near the Rideau River on May 6, 1915.

120. *Picoides arcticus* (Swainson). ARCTIC THREE-TOED WOODPECKER.—Uncommon resident, more frequently met with in winter, although R. E. DeLury saw one at the Experimental Farm on August 28, 1922[3]. C. G. Eifrig[4] reports finding it at Inlet, Que., (about 12 miles north of Thurso) on June 14, 1905, and it probably breeds in that portion of the district which comes within the Canadian zone. The same author gives data for several local specimens, and there are others in the White collection. C. E. Johnson has taken it at Galetta, Ont., and at Moose Creek for the Museum.

121. *Picoides americanus americanus* Brehm. THREE-TOED WOODPECKER.—A rare migrant—all specimens, so far as I am aware, have been taken in fall. It is not known in summer and there is no apparent reason for calling it "resident", as in the 1891 and 1910 lists.

122. *Sphyrapicus varius varius* (Linnæus). YELLOW-BELLIED SAPSUCKER.—Common summer resident, abundant in migrations; breeds. Nests have been found by F. A. Saunders, June 15th and June 24th[5], by Eifrig[6] and by C. L. Patch, at Rockcliffe, near Ottawa, during summers of 1921 and 1922. W. T. Macoun[7] records a most interesting habit of the species which indicates that this bird does much to compensate for any damage it causes to trees. He observed this species feeding on the Poplar Stem Gall (*Pemphigus populicaulis* Fitch) and, incidentally, stripping the tree, a Cottonwood (*Populus deltoidea*, Marsh) of the infested leaves.

123. *Phlæotomus pileatus abieticola* (Bangs.) NORTHERN PILEATED WOODPECKER.—A rare resident in the immediate vicinity of the city and it has suffered very much from thoughtless shooting in the more remote sections. Because of its erroneous name, "Woodcock", it is considered a game bird in some localities and in the 1891 list is said to be sent to market occasionally braced with Ruffed Grouse. Eifrig says that it has been seen on Parliament Hill. Ottawa specimens are entirely fall and winter ones so far as I am aware. E. G. White found a nest in South March, 1922, and Mr. Taverner reports the finding of a nest near King's Mountain, which was collected for the Museum Group; it is not known that the birds were nesting in this cavity at the time.

124. *Melanerpes erythrocephalus* (Linnæus). RED-HEADED WOODPECKER.—A rare summer resident—given as breeding in the 1891 list but without details. There are specimens in the White collection. During the summer of 1922 E. G. White and I found a pair near the Rideau River, while others were seen by me at Rivermead, west of Hull, Que., and one in the Government House Grounds, Ottawa.

125. *Colaptes auratus borealis* Ridgway. BOREAL FLICKER.—Common summer resident; breeds. Philip Foran showed me a nesting site near the Aylmer Road, west of Hull, in the fall of 1921. He said that a gang of men who were working on the road had killed one of the old birds and chopped open the nesting cavity—surely an example of wanton and needless destruction.

126. *Antrostomus vociferus vociferus* (Wilson.) WHIP-POOR-WILL.—A moderately common summer resident; breeds. D. Blakely took a set of eggs for the Museum, June 2, 1916. No. 1172.

127. *Chordeiles virginianus virginianus* (Gmelin.) NIGHTHAWK.—A common summer resident in the city, but Taverner found it uncommon in the course of his studies along the Rideau waterway in 1918. Breeds.

A nest was found on the roof of the Museum on June 29, 1917, and Eifrig gives an interesting account of a nesting in *O.N.*, XIX, pp. 56-58.

128. *Chætura pelagica* (Linnæus). CHIMNEY SWIFT.—Common summer resident; breeds. G. R. White has observed nests. There is a set of 4 eggs in the Victoria Memorial Museum, No. 739, taken by H. H. Selwyn, at Kirk's Ferry, Que., July 13, 1903. A large flock was observed performing aerial manœuvres over the East Block late in the summer of 1922 and finally going to roost either in a chimney or in the tower at the south-west corner of this block, gaining access through a broken window. A. G. Kingston[1] gives a very interesting account of the species at Ottawa, including a description of the manner in which the young are fed by regurgitation.

129. *Archilochus colubris* (Linnæus). RUBY-THROATED HUMMINGBIRD.—Common summer resident; breeds. A nest found by W. E. and F. A. Saunders on July 12, 1890, contained fresh eggs. W. T. Macoun showed me a very beautiful nest which blew down from a spruce tree at the Experimental Farm during a storm. It was saddled partly on a terminal twig and partly on a cone.

130. *Tyrannus tyrannus* (Linnæus). KINGBIRD.—Common summer resident; breeds. I saw a

[1] *O.N.*, V, p. 40.
[2] *O.N.*, XXIV, p. 184.
[3] *C.F.N.*, XXXVI, 1922, p. 119.
[4] *O.N.*, XXIV, p. 184, and *Auk*, XXIII, 1906, p. 316.
[5] *O.N.*, XII, p. 88.
[6] *O.N.*, XXIV, p. 184.
[7] *O.N.*, XXI, p. 183.

[1] *O.N.*, V, 1891-2, pp. 89-104.

nest near King's Mountain on June 3rd, 1919, and saw a bird building at Black Rapids on June 4th, 1921. L. M. Lambe took a set of five eggs for the Museum at Aylmer, Que., on June 15, 1889. No. 611, Victoria Memorial Museum.

131. *Myiarchus crinitus* (Linnæus). CRESTED FLYCATCHER.—A moderately common summer resident; breeds. It has nested in a bird box in Taverner's garden, and Eifrig gives a nesting occurrence, viz., at Blueberry Point, June 12, 1909. Nest with 6 eggs, No. 870, Victoria Memorial Museum, was taken at Eastman's Springs, Ont., by C. H. Young, June 11, 1908.

132. *Sayornis phoebe* (Latham). PHOEBE.—Common summer resident; breeds. May 14th, eggs, Eifrig; May 24, 1921, large young, C. E. Johnson.

133. *Nuttallornis borealis* (Swainson). OLIVE-SIDED FLYCATCHER.—Rare summer resident, found in the breeding season and presumed to breed. There are specimens in local collections.

134. *Myiochanes virens* (Linnæus). WOOD PEWEE.—Common summer resident, breeds.[1] Often found in the heart of the city. Nest with 2 eggs, June, 1892, A. G. Kingston, Victoria Memorial Museum, No. 147.

135. *Empidonax flaviventris* (W. M. & S. F. Baird.) YELLOW-BELLIED FLYCATCHER.—A summer resident, probably not common, but often escapes attention. Undoubtedly breeds, but there are no recent records. E. G. White took a bird, May 26, 1884. (*O. F.N . C. Trans.* 6, 1884-5, p. 273.)

136. *Empidonax trailli alnorum* Brewster. ALDER FLYCATCHER.—Common summer resident, found in the breeding season.

137. *Empidonax minimus* (W. M. & S. F. Baird). LEAST FLYCATCHER.—Summer resident, common; breeds. C. H. Young found five nests on June 3, 1911, at Meach's Lake, Que. One nest with four eggs was taken for the Museum collection. No. 956.

138*a*. *Otocoris alpestris alpestris* (Linnæus). HORNED LARK.—Known only as a casual migrant. It was found in numbers at the Experimental Farm in the spring and fall of 1890.[2] In spring it occurred from April 19th to May 25th and in fall from September 26th to October 28th. The following specimens were taken that year: White collection, May 2nd (1), May 6th (1), J. A. Fletcher; Fleming collection, April 1st (1), September 27th (1), October 6th (1), October 11th (1). F. A. Saunders. The specimens in the Fleming collection were identified by Oberholser, and I have carefully compared the ones in the White collection with specimens in the Museum. In 1895 E. G. White secured a single bird at the Rifle Ranges, on April 29th.

138*b*. *Otocoris alpestris praticola* Henshaw. PRAIRIE HORNED LARK.—Common summer resident and migrant. Eifrig gives the earliest breeding date as March 28th. C. H. Young found a nest at Hurdman's Bridge which contained four eggs on April 11th, 1900.[3] This is now No. 697, Victoria Memorial Museum.

138*c*. *Otocoris alpestris hoyti* Bishop. HOYT'S HORNED LARK.—I have found two specimens in the White collection which I consider to be of this sub-species. One of these was taken on May 2nd by J. A. Fletcher during the migration of *O. a. alpestris* in the spring of 1890. The other was secured on March 31, 1897.

139. *Cyanocitta cristata cristata* (Linnæus). BLUE JAY.—A moderately common resident; breeds. In May, 1911, C. H. Young found nest with four half-grown young at Meach's Lake, Que.

140. *Perisoreus canadensis canadensis* (Linnæus.) CANADA JAY.—Winter resident, rather irregular. Occurs at Waltham, Que., in summer, according to E. G. White, and may possibly breed in some of the northern parts of our area. Eifrig[1] reports wasps to be a staple food item.

141. *Corvus corax principalis* Ridgway. NORTHERN RAVEN.—A rare resident, presumed to breed. The Whites have secured specimens at Rockland, and Colonel White has seen these birds in the city in November, many years ago.

142. *Corvus brachyrhynchos brachyrhynchos* Brehm. CROW.—Abundant summer resident; breeds. Nested on Parliament Hill, April, 1906.[2] In recent years considerable numbers have wintered near the city—they did not do so formerly, according to G. R. White. In the winter of 1921-22 a flock of wintering birds near Ottawa South numbered about two hundred.

143. *Sturnus vulgaris* Linnæus. STARLING.—This importation from Europe has appeared in our midst during the spring of 1922 for the first time, having spread from the ever increasing hordes of the Eastern United States. The route followed is fairly well proved by occurrences in various localities along the way; e.g., Duck Island, Lake Ontario; and Hatley, Que. The first one seen in the Ottawa district was seen in that famous ornithological locality for this district, the Whites' garden, on April 2, 1922. It came to roost with the Grackles and the identification is confirmed by both E. G. and G. R. White. On April 8th, E. G. White saw two near the Nuns' Farm, Hurdman's Bridge. About April 18th Norman Lett found two in D. M. Finnie's yard, Chapel St. It is of interest to note that a specimen was taken at Arnprior, Ont., on April 19th, vide *C.F.N.*, XXXVI, 1922, p. 99.

144. *Dolichonyx oryzivorus* (Linnæus). BOBOLINK.—Common summer resident; breeds. C. E. Johnson has observed them in courtship, May 24, 1921, and also feeding young, June 25, 1922.

145. *Molothrus ater ater* (Boddært). COWBIRD.—Abundant summer resident; breeds.

146. *Agelaius phœniceus phœniceus* (Linnæus). RED-WINGED BLACKBIRD.—An abundant summer resident in suitable localities. I found a nest at Black Rapids on June 4, 1921, which was constructed in such a slovenly manner that one side had collapsed and the contents, fresh eggs, were dumped into the water.

147. *Sturnella magna magna* (Linnæus). MEADOWLARK.—A common summer resident; breeds. C. G. Eifrig gives a date for nest with fresh eggs, viz., May 11th. A few have been

[1]*O.F.N.C. Trans*, 3, p. 27.
[2]*O.N.*, V, p. 77.
[3]*O.N.*, XIV, p. 23.

[1]*Auk*, XXIII, 1906, p. 317.
[1]*O.N.*, XX, 1906-7, p. 49-50.

noted in the early winter, but I doubt if they could survive.

Hypothetical.

Sturnella neglecta Audubon. WESTERN MEADOWLARK.—One was recorded under the name *Sturnella magna neglecta*, by Macoun and Macoun[1], as having been taken at Ottawa. The specimen referred to is in the White collection dated October 8, 1894, and careful examination shows it to be *Sturnella magna magna*.

148. *Icterus galbula* (Linnæus). BALTIMORE ORIOLE.—A moderately common summer resident, breeding regularly in the city shade trees.

149. *Euphagus carolinus* (Müller). RUSTY BLACKBIRD.—An abundant migrant. Eifrig (*O.N.* XXIV, p. 199)[2] reports finding young birds newly fledged at Inlet, Que., on July 12, 1905. Doubt is thrown on the above breeding record by the fact that a specimen, No. 6036 in the Victoria Memorial Museum collection, taken at Doyle, Que., on July 19, 1912, and labelled by Eifrig *Euphagus carolinus* is a juvenile Bronzed Grackle.

Hypothetical.

Quiscalus quiscula quiscula (Linnæus). PURPLE GRACKLE.—In an early list[3] this is given, doubtless in error—*Quiscalus purpureus æneus* Ridg., Bronzed Grackle, appearing in a migration list for the spring of 1883.[4]

150. *Quiscalus quiscula æneus* Ridgway. BRONZED GRACKLE.—A very abundant summer resident, nesting everywhere in the city. On December 25, 1922, C. L. Patch saw one in his yard at Lindenlea, an Ottawa suburb. Newspaper publication of this occurrence elicited the information that Philip Foran found 3 wintering birds at Rivermead, Que., in 1920 and 2 at the same place in 1921. They seemed to spend most of their time in company with the Crows.

151. *Hesperiphona vespertina vespertina* (W. Cooper). EVENING GROSBEAK.—A fairly regular migrant and winter resident, often abundant. They first appeared at Ottawa, so far as known, in the spring of 1897, when two birds were taken on March 30th near Rideau Hall.[5] Eifrig says that two were shot near there on March 12, 1901.[6] (On the latter date three were seen at the Normal School, cf. *O.N.*, XV, p. 53). They were found in the winter of 1908-9[7]; in 1912-13; 1915-16; 1916-17; 1918-19; and every winter since, regularly staying until May.

152. *Pinicola enucleator leucura* (Müller). PINE GROSBEAK.—Irregular winter resident, abundant in some years. On October 27, 1903, E. G. White saw 1,500 at McKay's Woods, only two of which were in the red plumage.

153. *Carpodacus purpureus purpureus* (Gmelin.) PURPLE FINCH.—An abundant migrant and common summer resident, occasional in winter; irregular in its movements generally. W. T. Macoun records several nests found at the Experimental Farm.[8] There is a nest with four eggs of this species and one of the Cowbird in the Victoria Memorial Museum, No. 631, taken at Hull, Que., by A. R. Legge on May 28, 1899.

154. *Loxia curvirostra minor* (Brehm). CROSSBILL.—An exceedingly erratic visitor, which has occurred here in almost every month of the year. Sometimes common and may be found to breed, although no nests have been found yet, so far as I am aware.

155. *Loxia leucoptera* Gmelin. WHITE-WINGED CROSSBILL.—An erratic visitor, occasionally present in numbers but averaging scarcer than the last. The records for the district seem to show that it occurs more frequently in winter than at other seasons, although the Ornithological Branch[1] reports a flock in June, 1882.

156. *Acanthis hornemanni exilipes* (Coues). HOARY REDPOLL.—Occurs in winter with the other Redpolls, probably not very common. There are specimens in the White collection, and in the 1891 list[2] it is stated that W. L. Scott secured others in the spring of 1883, which were identified by Coues.

157*a*. *Acanthis linaria linaria* (Linnæus). REDPOLL.—An abundant migrant and winter resident. While it may sometimes remain later than usual, even into May, I do not think that the old summer records are sufficiently substantiated.

Hypothetical.

Acanthis linaria holboelli (Brehm). HOLBOLL'S REDPOLL.—P. A. Taverner advises me that there are two Redpolls in the National Museum collection from Mattawa, Ontario (outside our present district), being numbers 6004 and 6006, which appear to be of this sub-species. Oberholser has identified No. 4768, a similar long-winged bird as *holboelli*. However, Taverner does not consider the sub-species tenable on the material he has available. If *holboelli* should prove to be a valid sub-species it can probably be looked for in the Ottawa district among the other wintering Redpolls.

157*b*. *Acanthis linaria rostrata* (Coues). GREATER REDPOLL.—Occurs in winter with its congeners. There are undoubted specimens in the White collection and G. R. White's early report in *O.N.*, ii, p. 150, is consequently corroborated.

158. *Astragalinus tristis tristis* (Linnæus). GOLDFINCH.—Abundant migrant and summer resident; occasionally common in winter; breeds. G. R. White has many dates recorded in his notes for the winter of 1885-6, from January 14th on. Large flocks are said to have wintered in 1888-9. C. E. Johnson collected a nest with six eggs for the Museum near Ottawa, July 31, 1916. No. 1191.

159. *Spinus pinus* (Wilson.) PINE SISKIN.—A common though irregular winter resident and believed to breed. Eifrig[3] reports the finding of a nest, but gives no details, and I know of no others. On July 28, 1922, I saw a single bird at Rockcliffe. However, the species is commonly reported at Ottawa in May, and I have found it breeding in early April at Toronto, so it may breed in this vicinity more commonly than suspected at present. The species was exceedingly abundant on December 24, 1922—six parties of the Ottawa Field-Naturalists' Club finding approximately 900 individuals during the course of the day. It was by far the most abundant bird at the census taken on that date.

(To be concluded)

[1]*Cat. of Can. Birds*, 1909, p. 433.
[2]Also cf. *Auk*, XXIII, 1906, p. 317.
[3]*O.F.N.C. Trans.*, 3, p. 30.
[4]*O.F.N.C. Trans.*, 5, p. 144.
[5]*O.N.*, XI, p. 32.
[6]*O.N.*, XXIV, p. 199.
[7]*Ibid.*
[8]*O.N.*, XVII, p. 28.

[1]*O.F.N.C. Trans.*, 4, p. 87.
[2]*O.N.*, V, p. 43.
[3]*O.N.*, XXIV, p. 200.

PROSECUTIONS

Migratory Birds Convention Act by Officers of the Canadian National Parks and Royal Canadian Mounted Police

Reported during the period November 23, 1922 —July 23, 1923.

Tremblay, Eugene, St. Simeon, P.Q. Having in possession portions of migratory birds in close season. Acquitted.

Carre, Joseph, St. Simeon, P.Q. Having in possession portions of migratory birds in close season. Acquitted.

Bridges, Byden, Lakeville Corner, Sunbury Co., N.B. Hunting migratory birds in close season. Case dismissed.

Byno, Donald, Lakeville Corner, Sunbury Co., N.B. Hunting migratory birds in close season. Case dismissed.

Gaskill, Eben, North Head, N.B. Having in possession migratory non-game birds—Herring Gulls. Fine $10.00.

Watt, L. C., North Head, N.B. Having in possession migratory non-game birds—Herring Gulls. Fine $10.00.

Small, Oscar, North Head, N.B. Having in possession migratory non-game birds—Herring Gulls. Fine $10.00.

Bouchard, Wm., St. Simeon, P.Q. Having in possession portions of migratory birds in close season. Acquitted.

Carre, Lucien, St. Simeon, P.Q. Having in possession portions of migratory birds in close season. Acquitted.

Chase, Charles A., Chester, Lunenburg Co., N.S. Molesting Ducks in close season. Fine $10.00.

Westhaven, Wm., Digby, N.S. Shooting a Herring Gull. Case dismissed.

Westhaven, Wm., Digby, N.S. Shooting at Ducks in close season. Case dismissed.

Jones, C. F., 2085-6th Ave., West Vancouver, B.C. Having in possession six Sandpipers. Fine $10.00.

Laforet, Edmond, Tecumseh, Ont. Hunting migratory game birds in close season. Fine $10.00.

Leblanc, G. P. C., 383 Victoria Ave., Westmount, P.Q. Having in possession one Great Blue Heron. Fine $10.00. Seizure: One Great Blue Heron.

Forster, Richard J., Leamington, Ont. Killed or molested migratory game birds in close season. Fine $10.00

Milkins, Hez., Leamington, Ont. Killed or molested migratory game birds in close season. Fine $10.00.

Wigle, Forest, Leamington, Ont. Killed or molested migratory game birds in close season. Fine $10.00.

Miles, Oper, Con. "C," in Mersea Tp., near shore of Lake Erie, Ontario. Killed or molested migratory game birds in close season. Fine $10.00.

Meloche, Charles, 3rd Con., Anderton Tp., Essex, Ont. Hunting migratory game birds in close season. Fine $25.00. Seizure: Seven wooden decoys, 10 rounds of .12 gauge shot gun ammunition, two dead ducks.

Rousseau, Ferdinand, 3rd Con., Anderton Tp., Essex, Ont. Hunting migratory game birds in close season. Case dismissed. Seizure: Cartridges.

Landry, ——, Cape Bauld, Westmorland Co., N.B. Hunting migratory game birds in close season. Fine $10.00.

Bezanson, Robie, Port Williams, King's Co., N.S. Hunting migratory game birds in close season. Fine $10.00.

Backman, Alton, Port Williams, King's Co., N.S. Hunting migratory game birds in close season. Fine $10.00.

Bezanson, Percy, Port Williams, King's Co., N.S. Hunting migratory game birds in close season. Fine $10.00.

Bezanson, Kempton, Port Williams, King's Co., N.S. Hunting migratory game birds in close season. Fine $10.00.

Bent, Frederick, Mosher's Corner, N.S. Killing two migratory game birds in close season. Fine $10.00.

Reid, John, Jr., Cape Tormentine, N.B. Hunting migratory game birds in close season. Fine $20.00.

Boudreau, Patrick, Barachois, N.B. Hunting Canada Geese in close season. Fine $10.00.

Boudreau, Hector, Esquimaux Point, P.Q. Hunting Canada Geese in close season. Fine $10.00.

Buchberger, Anthony, Churchbridge, Sask. Having in possession two wild ducks (dead) in close season. Fine $10.00.

Kelley, David, Loggieville, N.B. Shooting Canada Geese in close season. Fine $10.00.

McInary, Bert, Loggieville, N.B. Shooting Canada Geese in close season. Fine $10.00.

Kelley, Wm., Loggieville, N.B. Shooting Canada Geese in close season. Fine $10.00.

Carver, Walter, Charlottetown, P.E.I. Molesting Canada Geese in close season. Fine $10.00.

Juvenile, Esquimaux Point, P.Q. Found in possession of Gulls' and Eiders' Eggs. Fine $10.00. Confiscations: Eggs.

Juvenile, Esquimaux Point, P.Q., Found in possession of Gulls' and Eiders' Eggs. Fine $10.00. Confiscations: Eggs. Sentence suspended.

Musgrave, David, Gray Island, B.C. Having in possession Gulls' eggs. Case dismissed.

Wesley, Peter, Gray Island, B.C. Having in possession Gulls' Eggs. Fine $10.00.

Musgrave, W. H., Gray Island, B.C. Having in possession Gulls' Eggs. Fine $10.00.

McKay, James, Gray Island, B.C. Having in possession Gulls' Eggs. Fine $10.00.

Provincial Officers have brought the following prosecutions under The Migratory Birds Convention Act.

Wah, Zip, Extension, B.C. Having in possession a migratory insectivorous bird—a Flicker. Fine $10.00.

Keen, J. J., Nanaimo, B.C. Having in possession Gulls' Eggs. Bail of $20.00 forfeited.

NOTES AND OBSERVATIONS

MYSTERY BANDS.—Two mystery bird bands, or bands without traceable marks of identification, have recently come to the attention of the Canadian National Parks Branch, which Branch is keeping the file of Canadian Bird Banding Records.

The first of these was on a Junco, found by Mr. Ernest Joy, of Wood Island, Grand Manan, New Brunswick. This bird was killed at Gannet Rock light-house, presumably during the month of June, 1923, and was marked with a plain band. Mr. Joy thought the band had worn smooth, but as this hardly seems credible, it may be that it bore no inscription when placed.

The second instance of this kind, which has come to the attention of the Branch recently, was that of a banded Swan, species ?, shot one hundred miles north-east of Good Hope, on the Mackenzie River. This capture was reported by Mr. A. Brabant, Fur Trade Commissioner of the Hudson's Bay Company. The band is made of fourteen-guage copper wire twisted once so that is has a loop at one end of the band through which the two ends of the wire have been hooked. The band shows very considerable wear, being almost half worn through, front and back, and may have been on the bird quite a number of years. It is one inch in diameter. Possibly this ring may have been used as part of the leash of a decoy Swan. The band will be loaned to responsible persons who consider that they may be able to furnish information concerning it. The sketch given with this article may be of use for identification purposes.



Future occurrences of banded birds, the bands of which cannot be traced, will be mentioned in *The Naturalist*, and it is hoped that any person having any information respecting birds marked anonymously, and any information respecting bird bands in general, whether inscribed with distinguishing marks or not, will communicate with the Canadian National Parks Branch. The use of bands of a character which cannot be traced is deprecated. Official bands, which can be traced, are available for those who wish to carry on this work, and the use of unofficial bands and of those which are untraceable may cause confusion in the records.—HOYES LLOYD.

HUMMINGBIRD CAUGHT BY BURDOCK.—In view of the note by Mr. Hoyes Lloyd on page 75 of the April (1923) number of *The Canadian Field-Naturalist* regarding the untimely death of a Brown Creeper, the following record will probably be of interest.

While out walking in the bush near Sault Ste. Marie, Ontario, on Sunday, August 14th, 1923, I observed an immature Hummingbird caught in the flower head of the Common Burdock. It had evidently struggled considerably after being caught, as the plumage was much ruffled and the carcase securely held. The bird had evidently been dead for some time, as little remained but the shell, ants having eaten all that was eatable of the carcase. The branch of the plant holding the bird was cut off and shipped intact to the Victoria Memorial Museum, Ottawa.—W. H. A. PREECE.

BALD EAGLE CAPTURING SEA-GULL.—Provincial Game Warden J. C. Cunningham of Vancouver, B.C., who has charge of the Game-patrol launch *Wattla* recently submitted to the Secretary of the Game Conservation Board of British Columbia a report in reference to the predatory habits of the Bald Eagle which is thought to be of particular interest.

He writes that on May 10th, 1923, while he was proceeding along the shore line of Nelson

Island in the vicinity of Cape Cockburn, a Bald Eagle was seen pursuing a Sea-gull. The Gull, twisting and dodging, headed out to sea, while the Eagle, tireless in pursuit, was close behind its victim at every turn. For a time both birds appeared to have much the same speed but eventually the greater staying power of the Eagle began to tell and the tired Gull, after making a dip towards the water, commenced to rise whereupon the Eagle seized the bird in its claws and flew towards Nelson Island, which was then about a mile and a half distant.—J. A. MUNRO.

UNUSUAL MARKINGS ON A FLICKER.—A male Flicker, *Colaptes auratus auratus*, taken on July 15, 1919, at Port Sydney, Ontario, shows three red feathers in the black markings which extend from the base of the bill down the sides of the throat. Other records of specimens possessing red feathers in the "moustache" are from places equally far removed from the usual range of species which normally have red markings on the sides of the throat. Hybridization does not seem to be as satisfactory an explanation as mutation, or perhaps reversion.—L. L. SNYDER.

AN ALBINISTIC GRACKLE.—A partially albino Grackle (presumably *æneus*) was taken on Toronto Island on August 6, 1923, by Wm. LeRay. Four secondaries on each wing, the wing coverts, the rump feathers and a small area on both sides of the breast are a buff color. The rest of the feathers are white and the specimen had a buffy iris, not the pink eyes of a pure albino.—L. L. SNYDER.

SECOND TORONTO RECORD OF THE CAROLINA WREN.—A Carolina Wren (*Thryothorus ludovicianus ludovicianus*) was taken in the Humber Valley, near Toronto, on October 17, 1923, by J. L. Baillie. This species has been recorded from Mount Forest, St. Thomas, Point Pelee, Toronto and Hamilton, but it is rare and of irregular occurrence in Canada. The specimen taken by Baillie constitutes the second Toronto record, the first being that of a bird taken by J. H. Fleming, on May 20, 1917. It is a male, in good condition, and is now mounted and in the collection of the Royal Ontario Museum of Zoology, at Toronto.—L. L. SNYDER.

BIRD PROTECTION IN TASMANIA.—It is interesting to observe in the September, 1923, number of *Picturesque Tasmania*, published by the Tasmanian Government Tourist Bureau, that there is a proposal to make Macquarie Island "a faunal reserve for the unique animal and bird life of the Antarctic regions".

This number also contains an interesting account of the bird life of this Island, upon which, it has been reported, serious destruction of bird life was being occasioned by sealers.

It is hoped that our Tasmanian friends will be successful in their efforts to protect their wild life, and prevent the extinction of the interesting forms which occur there.—HOYES LLOYD.

NOTICE OF PROPOSED AMENDMENT TO THE CONSTITUTION.—At the annual meeting for 1922, Mr. P. A. Taverner, acting for the Council, gave notice of the following proposed amendment to the Constitution:—

RESOLVED that the following sentence be added to Article VI of the Constitution, viz., "Presidents of affiliated societies shall be ex-officio members of the Council."

REPORT OF *The Ottawa Field-Naturalists' Club* FOR THE YEAR 1922.—The Ottawa Field-Naturalists' Club, organized March 8, 1878, to foster an acquaintance with and a love for nature by providing free lecture courses, conducting out-of-door excursions, and publishing the results of original research or investigation in all departments of natural history, has now completed the forty-fourth year of its existence.

The club membership numbers about 525.

The following field excursions to localities of biological and geological interest in the vicinity of Ottawa were held in 1922: May 6, Geology and Physiography, McKay's Lake; May 13, Frogs, Snakes, Toads, Salamanders, etc., Gatineau Point; May 20, Birds and Other General Natural History, Fairy Lake vicinity; May 27, Flowers and Other General Natural History, Queen's Park, Aylmer. Any person interested in natural history had the privilege of attending, and scientific men acted as leaders to direct interest and answer questions. The average attendance was forty-two.

The Canadian Field-Naturalist was being used at the close of 1922 as a medium of publication by seven affiliated societies as follows: McIlwraith Ornithological Club (London, Ont.); Hamilton (Ont.) Bird Protection Society; Alberta Natural History Society; Province of Quebec Society for the Protection of Birds; Vancouver (B.C.) Natural History Society; Natural History Society of Manitoba; and The Natural History Society of British Columbia.

During the year The Ottawa Field-Naturalists' Club co-operated with Mr. W. T. Macoun in the publication of *The Autobiography of Professor John Macoun*, an extremely interesting volume dealing with the early development and natural history of the Dominion.

The officers and committees for the year 1923 are as follows:

President, Hoyes Lloyd; Vice-Presidents, G. A. Miller, Norman Criddle; Secretary, Clyde L. Patch; Treasurer, C. B. Hutchings; Editor, Harrison F. Lewis, Past-President, R. M. Anderson.

Additional members of Council: W. T. Macoun, Miss M. E. Cowan, C. M. Sternberg, Harlan I. Smith, F. W. Waugh, P. A. Taverner, E. Sapir, E. M. Kindle, W. J. Wintemberg, R. E. DeLury, Arthur Gibson, M. O. Malte, C. H. Snell, J. R. McLeod, L. McI. Terrill, John Davidson, R. Owen Merriman, H. M. Speechly, W. N. Kelly.

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Ornithology: P. A. Taverner, C. L. Patch, Hoyes Lloyd, R. E. DeLury.

Zoology: Dr. R. M. Anderson, A. Halkett, C. L. Patch, C. H. Young, C. E. Johnson, E. J. Whittaker.

Photography: W. S. Hutton.

—CLYDE L. PATCH, *Secretary.*

REPORT OF HAMILTON BIRD PROTECTION SOCIETY, 1922-23.—The 4th Annual meeting of the Society was held at Hamilton, April 9, 1923. Reports of Officers and Committees were read, showing that another year of successful work has been accomplished.

Five regular meetings of the Society were held during the year, when W. E. Saunders, of London, Ont., Stuart Thompson, of Toronto, and three local speakers, Dr. Arnott, R. O. Merriman, and C. D. Cook were heard and greatly appreciated

Weekly bird walks were taken and a large list of migratory birds was reported. These lists were compiled in the Spring and Fall and sent to the Government.

A Christmas Bird Census was taken again this year, with more successful results than last, owing to more parties working in different parts of the city, with a larger list of birds reported.

Through a very generous donation of one of its members, H. C. Merrilees, instructive bird posters showing the economic value of some of our common birds were printed and distributed.

A cancellation stamp, bearing the formula "Protect the Birds and help the Crops" was used last Spring on all out-going mail at Hamilton. This was used as a means to advertise bird protection.

A Bird Box Competition was held again this Spring when a great many useful and handsome boxes were turned in. These were bought from the boys after prizes of tools had been given them, and were erected on one of our roadway drives.

In January a great number of Ducks were found in a starving condition in the Bay. These were fed by members of the Society by donations of grain and greens.

We are looking forward to doing greater things this coming year than ever before, ever hoping that our efforts, though small, will help to conserve and protect wild life for future generations.—RUBY R. MILLS, *Secretary.*

PUBLICATIONS RECEIVED

Annals of the Missouri Botanical Garden, Vol. X, No. 2, April, 1923.

The Tree-Planting Division: Its History and Work. By Norman M. Ross, B.S.A., B.F., Superintendent.

Forest Investigative Work of the Dominion Forest Service. By W. G. Wright, B.Sc.F.

White Pine. Tree Pamphlet No. 1. Forestry Branch, Department of the Interior, Canada.

White Spruce. Tree Pamphlet No. 2. Forestry Branch, Department of the Interior, Canada.

Douglas Fir. Tree Pamphlet No. 3. Forestry Branch, Department of the Interior, Canada.

Hemlock. Tree Pamphlet No. 4. Forestry Branch, Department of the Interior, Canada.

The Forests of Canada. Forestry Branch, Department of the Interior, Canada.

Boletin de la Secretaria de Comunicaciones y Obras Publicas. Tomo II, Num. 3, Mexico, 1922.

Anales de la Secretaria de Comunicaciones y Obras Publicas. Tercera Serie. Tomo V. Ano de 1922. Mexico, 1923.

The North Staffordshire Field Club. Transactions and Annual Report, 1922-23. Edited by S. A. H. Burne, M.A.

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The Membership Committee of The Ottawa Field-Naturalists' Club is making a special effort to increase the subscription list of *The Canadian Field-Naturalist* and we are asking every reader to assist in making the campaign the success it should be.

We would particularly urge the Secretary of each Affiliated Society to bring this matter up at EVERY meeting and secure as many subscribers as they possibly can to the ONLY Canadian Magazine devoted to the study of Natural History in all its phases.

Use the blank below and forward it to the Treasurer.

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Treasurer, Ottawa Field-Naturalists' Club,
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THE CANADIAN FIELD-NATURALIST, lately THE OTTAWA NATURALIST, established thirty-six years ago, "to publish the results of original research or investigation in all departments of natural history," is issued monthly, excepting for the months of June, July and August.

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The Canadian Field-Naturalist

VOL. XXXVII OTTAWA, ONT., DECEMBER, 1923 No. 9

NOTES ON THE AMERICAN WOODCOCK (Rubicola minor)

By W. J. BROWN

ALL NATURALISTS look forward to the approaching springtime and none more so than the writer. How eagerly we all anticipate the first migrants and look over our notes of the previous season to refresh our memory as to the exact dates on which the early birds reached us. We cannot foretell with any degree of certainty the day the Woodcock will arrive, as he must be guided by weather conditions, it seems to me, more than other spring migrants and is dependent upon moist ground in which to probe for food. Should the spring be a normal one, the Woodcock reach us about the last week in March and a few days later the birds' wonderful "towering" or spiral flight may be observed in the silence of the early evening if we have the patience to linger on the outskirts of alder swamps, brushy woodlands, or thickets bordering streams. The bird is known to perform also in the early hours of the morning. During the first days of April I have heard as many as six Woodcock soaring simultaneously, the flight usually commencing about 7.30 P.M. and being maintained for at least a period of one hour, when I had to depart. I have heard the Snipe soaring throughout the night in the Province of Quebec and in Newfoundland, but whether the Woodcock continues his impressive romance at intervals all night I am unable to say.



WOODCOCK ON NEST IN HARDWOOD FOREST. ISLE JESUS, QUEBEC, APRIL 29, 1923

Image of sitting bird, three-fourths of an inch long, is in the right foreground

At the height of the mating season the male usually begins his flight within 100 yards of the brooding female and alights near the starting point. I located three nests of this species and for three successive nights I camped an hour at a reasonable distance from the sites. In two cases the male rose from a scrubby field at a point 75 yards away from the nest and pitched to the ground but a few yards from the starting point. In the third case the male departed within forty yards of the sitting female and returned to the same place.

That the Woodcock's song is a wonderful and beautiful performance no one will deny. One moonlight night, in April, we were waiting amongst the alders and birches for the first bird to make the initial flight of the evening. A nasal intonation or Nighthawk call greeted us several times--an odd and curious preparation for the aerial evolutions to follow—then a faint whistling wing-note was heard, or were they the notes of a Chimney Swift? My friend hissed through the vernal air, "There he goes," and sure enough up springs the first bird of the night. As the Woodcock mounted higher and faster, sweeping about in wide circles, we could hear these remarkable twitterings and clear Swiftlike notes becoming more sharply accentuated; but to my mind the real love song begins on the erratic downward course The bird appears to be a ventriloquist as he hurls himself

earthwards. The notes—which resemble thousands of drops of water falling from the roof of a cavern to the pool below—strike the listener as if thrown or jerked into space from all sides of the animated acrobat and for a moment it is difficult to grasp where this reckless plunge will terminate.



NEST AND EGGS OF WOODCOCK, SHOWING SURROUNDINGS.
ISLE JESUS, QUEBEC, APRIL 29, 1923.

Under these circumstances it is not impossible to imagine the bird performing a nuptial sky-dance as he zigzags to the ground. This particular bird alighted a scant fifteen feet distant in an open spot flooded with moonlight, and we stiffened to closer attention and held our breaths. The Woodcock was plainly visible and we strained our eyes, watchful of the next movement, but the bird could not rest a moment and shot upward again to repeat a similar feat. Two other Woodcocks were in a responsive mood and then it occurred to me that this love song has a strangely penetrating quality. One cannot remain impassive to this romantic performance which dominates the night —and it is with mixed feelings that we make our way homeward.

The Woodcock is a common summer resident in the counties of La Prairie and Laval, Quebec. Since the spring of 1921 considerable time has been spent by me in the haunts of these birds and I can speak with confidence as to their numbers. The spring of 1921 was an early one, the snow having left the open country by March 15th. On April 17th, an Indian on the Caughnawaga Reservation (County La Prairie) showed us a Woodcock's nest wtih four eggs, ready to hatch. This bird must have laid the full complement by the end of March and this is an early record for this part of the country. The nest was a slight hollow in the ground amongst saplings at the edge of the wood, and was lined with leaves. The day before a sleet and snow storm had occurred and it was an interesting sight to watch the sitting bird amid wintry conditions. There was a cold wind-storm prevailing at the time of our visit, but the Woodcock sat closely in the face of these and other adverse circumstances. On April 24th my friend located a deserted nest of this species amongst alders, with three broken eggs, the embryos being well formed. Some animal no doubt destroyed the nest.

On March 26th, 1922, the first Woodcock of the season was noted. On April 14th, on the Caughnawaga Indian Reservation (County La Prairie), I flushed a female in mixed growth, principally conifers, and fifteen feet away I found the nest, containing three fresh eggs, in a mound under a cedar bush. The nest was lined with leaves and supported by a mass of moss. The female had not started to sit yet, awaiting the deposit of the fourth egg. Two days later she was sitting on four eggs.

During the season of 1923 a number of nests were located in the Counties of Laval and La Prairie.

In one section eight birds were flushed in damp alder thickets, evidently banquet grounds, judging by the numerous signs. The first nest was located on April 29th in a decayed brush heap amongst birches near the edge of large growth of mixed timber. We flushed the male repeatedly and in each case he only fluttered off a few yards and dropped to the ground—sufficient evidence in itself that important interests were nearby. My companion passed within two feet of the sitting female, but when I placed my foot on the edge of the brush heap a few minutes later the secret was known. The female rose with tremulous wings and alighted in the shrubbery thirty yards away. We withdrew 100 yards, but inside of an hour the

bird had not returned. The nest contained four fresh eggs and was a slight hollow lined with leaves and a trace of moss. Another nest was found the same day in a similar situation at the edge of large hardwood growth, facing a scrubby, wet pastureland. My friend, on entering this hardwood area, almost placed his foot on the sitting bird. This nest also contained four eggs well advanced in incubation. The nest was merely a hollow in an old brush heap and was protected from the north by a rotten log. In half an hour the bird returned and she made a patient subject for photography. Another nest with three beautifully marked eggs was found the same date underneath a cedar bush in second-growth woods. The whereabouts of this nest were easily ascertained by the movements of the male, which was disturbed time and again and would not leave a bushy area some 25 yards square. I was walking along slowly and observed the sitting bird about ten feet off. I returned to take some photographs ten days later but found that the nest and contents had been destroyed by one of the numerous enemies which beset ground-nesting birds.

On May 12th six more Woodcocks were flushed in alders along the bank of a small stream, although only two nests, with four eggs each, were discovered. I located a bird sitting on a nest placed between two birch saplings and slightly concealed by an overhanging branch of an alder bush. The other nest was about two hundred yards away and was placed about five feet from the bank of a stream and between two small alder bushes. Both nests were mere depressions in the soil and were lined with leaves. I quietly watched the sitting birds and tested their patience for some time and finally placed my hand within one foot of the nests and the females left abruptly as if they had just been discovered. On May 19th I met with three more nests, with sets of four eggs well advanced, in second-growth bordering big timber, the birds in all cases sitting close. After some experience it is not a difficult process to pick out the brooding female. The eye becomes trained and the birds have been detected at a distance of ten feet.

By May 15th I have seen the young of the year well on the wing and on May 8th I came across a parent in charge of a newly hatched brood, so it is apparent that the females do not begin procreant activities at the same time.

The Woodcock feeds mainly at night and hides closely by day. Its food is obtained by probing and the holes or "borings" in the ground are indications of the neighborhood of the bird. The food consists largely of worms and soft-bodied insect larvæ.

My autumn records are thin and narrow, as I have never encountered a "coming in." When journeying through the country at dusk I have raised a few individuals and they invariably dart up over the tops of the saplings and immediately take a horizontal course a short distance and descend again. My latest fall note is October 21st.

This species migrates at night and this habit no doubt has been the means of protecting the bird from being entirely exterminated.



CLOSER VIEW OF NEST AND EGGS OF WOODCOCK.
ISLE JESUS, QUEBEC, APRIL 29, 1923.

THE FLOWER RELATIONS OF WILD BEES*

By HENRY L. VIERECK

IT IS especially well known to horticulturists that plants of the Cucurbitaceæ or gourd family are monœcius, i.e., have stamens and pistils in separate flowers on the same plant, and that willows and some other plants are dicœcius, i.e., have staminate and pistillate flowers on different plants, and are, therefore, in need of outside factors to bring about fertilization. It is in such plants that wild bees play an important part because of their quest for nectar and their ability to collect pollen.

Even in fruit blossoms and in many other flowers where both stamens and a pistil are in the same flower many species are self sterile and dependent upon cross fertilization brought about by the nectar and pollen-collecting wild bees.

There is a seemingly endless modification in the structure of the wild bees in harmony with the modifications found in the structure of the flowers visited and the special pollen-collecting apparatus or scopa is present only in the females.

There are thousands of species of wild bees in America north of Mexico. East of the 100th meridian in southern Canada and in the United States it is no doubt possible to collect 200 or 300 or more species in almost any locality, while west of the 100th meridian a still greater number may be found. Judging from our knowledge of the wild bees in localities east of the 100th meridian one-fourth to one-third of the wild bees to be found in a given locality will be parasitic or inquilinous and not equipped to collect pollen as effectively as most of the remaining three-fourths or two-thirds. The true pollen-gatherers which so outnumber the parasitic and inquilinous bees are, from the standpoint of their pollen-gathering apparatus, divisible into two groups according to how the pollen is carried. The most numerous group, each of which has a brush on the hind tibia, known as a pollen basket, may be called the Podilegidæ, whereas the less numerous group, each of which has a brush or pollen basket on the under side of the abdomen, has been called the Gastrilegidæ.

The scopa or pollen basket in the Podilegidæ is usually made up of simple reclining stiff hairs, but in a number of genera certain species have the hairs of the scopa more or less densely branched or plumose.

Now the Podilegidæ or tibia collectors are further divisible into the once-a-year social or bumble bees and the solitary bees.

Of the once-a-year social bees we have the genus *Bremus*, formerly known as *Bombus*, species of which have been introduced into New Zealand, where bumble bees are not indigenous, to make possible the production of red clover seed, since without the intervention of these bees the red clover florets remain sterile.

The solitary Podilegidæ or tibia collectors are a numerous host of which we have the long-tongued solitary bees, the Anthophoridæ, the small carpenter bees or Ceratinidæ, the large carpenter bees or Xylocopidæ, the pigmy bees or Panurgidæ, the great-legged bees or Macropidæ, the Dufoureid bees or Dufoureidæ, the acute-tongued burrowing bees or Andrenidæ, the sweat bees or Halictidæ, the obtuse-tongued burrowing bees or Colletidæ, and the obtuse-tongued carpenter bees or Hylæidæ.

It is the members of the long-tongued solitary bees, the Anthophoridæ, that play such an important part in the fertilization of the Cucurbitaceæ or gourd family. So devoted are these bees to their task that sometimes certain species are imprisoned by the withering flower shutting them off from the outside world.

The small carpenter bees, or Ceratinidæ, the familiar users of bramble stems for nesting, have a simple haired scopa and are polytropic, i.e., visit a great variety of flowers.

The large carpenter bees, which sometimes become a nuisance through their borings in wooden structures, also have a simple haired scopa and are polytropic.

Some of the pigmy bees like *Calliopsis* live in towns and some are so specializing in their choice of a flower to sack, that unless one visits the particular flower selected one can collect for years in a region without ever getting a specimen of the bee in question. *Perdita halictoides* is an example. This species was described by Frederick Smith seventy years ago and it was not until a few years ago that the species was again taken and not until subsequently, when it was found that this species visits presumably only the flowers of *Chrysopsis mariana*, was it possible to look for this species with any degree of certainty as to the success of the quest.

The great-legged bees or Macropidæ can usually be found collecting pollen on any of the loosestrife flowers of the genera *Steironema* and *Lysimachia* and nectar on the flowers of the dogbane of the genus *Apocynum*. I have never seen these bees on any other flowers.

Of the Dufoureid bees or Dufoureidæ we have a species, *Conohalictoides novæ-angliæ*, that collects

*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agriculture, Ottawa.

pollen only in the flowers of the pickerel-weed, *Pontideria cordata*. When this species was recorded from Wisconsin as a visitor of members of the mint family such as *Monarda* and *Agastache*, I asked to see the material because I thought it strange that *Conohalictoides novæ-angliæ* should be so versatile in Wisconsin and so specialized farther east and on dissection I found the specimens to be tangibly different, leaving *Conohalictoides novæ-angliæ* still a monotropic visitor of the pickerel weed.

The most numerous in species are the acute-tongued burrowing bees or Andrenidæ of which we have over 600 species in Canada and the United States. So far as we know at present many species of this family collect pollen only on one species of flower and although the tongue in this family is usually short, it is much lengthened in the species known to visit only violets, notably *Andrena violæ*, placed by Robertson in a separate genus *Iomelissa* on account of its elongated mouth parts. Many species in the Andrenidæ have a scopa of branched or plumose hairs.

The sweat bees or Halictidæ, which may have been noticed lapping up perspiration from the human hand, are not so particular in their visits as the preceding families and invariably have a scopa of simple hairs.

The obtuse-tongued bees or Colletidæ are well known town builders, having been found, in the case of *Colletes inequalis*, to have as many as 200 homes within a square yard of waste field. Some species of the obtuse-tongued bees are known to be special visitors and all of them have a scopa of simple hairs.

The obtuse-tongued carpenter bees or Hylæidæ, which look so much like potter wasps, are twig nesters, polytropic, and differ from the other solitary Podilegidæ or tibia collectors in that they have no scopa or pollen basket.

The Gastrilegidæ, which have the simple-haired pollen basket or scopa on the underside of the abdomen, include the original free masons, the mason bees or Osmiinæ, the leaf-cutting bees or Megachilinæ and the potter-bees or Anthidiinæ.

The most celebrated of these are the leaf-cutting bees, which play such an important part in the tripping of alfalfa flowers and the consequent fertilization of that important forage crop.

With such a wealth of wild bees around us it should be patent to all how in a given locality where honey bees are few or absent, the wild bees can be the most important factor in the insect fertilization and cross-fertilization of flowers and even in the presence of honey bees in great numbers they no doubt still play their part and act to bring about luscious, well-developed fruits.

THE PROVANCHER SOCIETY OF NATURAL HISTORY OF CANADA—REPORT OF THE INSPECTION OF THE RAZADES

JUNE, 1922

THE RAZADES are two islands of equal size, separated by a distance of about three quarters of a mile; their dimensions may be figured to be between 1000 and 2000 feet in length and about 400 feet in width. They are three-quarters of a mile distant from the shore of Cape Marteau, below Trois-Pistoles, in the lower St. Lawrence River.

Be a very fine summer temperature, on the 25th of June, 1922, Dr. A. Déry, MM. Jos. Matte and Louis Lavoie, three members of the Provancher Society, arrived at the Razades, on board of the yacht *Pélerin*, generously put at their disposal by the owner, Dr. S. Gaudreau, one of the Directors of the Society. They anchored at one hundred feet off shore. From the deck of the yacht they could see by hundreds Ducks coming down on the sand, from their nests, to take the water. Almost as soon as they reached the shore, they realized that the birds were not very shy as they could approach them within fifty feet; proving that they feel quite safe on their island. They seemed rather astonished at the disturbance of their solitude than afraid of their approach. They started their inspection by ascertaining the number of nests of Eider Ducks. The ground of the island was literally covered with nests, so close to one another than it was difficult to find one's way between them. They counted five hundred of them, and it is sure that many escaped their notice. The average number of eggs in each nest was five; in some cases as many as ten have been found in the same one. Most of the Duck nests are protected from the sight by celery, which has run wild on the island, and water grasses, which grow in profusion there.

If we compare the number of nests counted this year with the number recorded a few years ago, we realize a very encouraging improvement. In fact, then only 154 nests were recorded and all of them empty, due to poachers stealing eggs. This is proved by the report made then.

Not only the Eider Duck is found in this important nesting place. Many nests of Herring Gulls were also found. They are getting along pretty well together; some nests were discovered

to contain eggs of both Ducks and Gulls. In about half of the nests the eggs were at the hatching period; many small birds were out of the shell.

One colony of Double-crested Cormorants was also found on the same island, in the south-west part. Around forty nests were counted.

The party then sailed to the Upper Razade. One hundred and fifty nests only were recorded of Eider Ducks; but there was an important colony of Herring Gulls. The explanation for the small number of Eider Ducks here is probably due to the fact that visitors, although peaceful and not carrying firearms, come more often on this island than on the other. The hatching period of the Ducks is not any earlier here than on the Lower Razade. By contrast, the Gulls had hatched earlier and the greater part of the young ones had been in existence for fifteen days. One of the inspectors is a member of the New England Bird Banding Association and he had numbered aluminum bands.

They put these bands to 33 young Gulls. The object of this marking is to study the migration of the birds, to find out just where they go, if in the spring they come back to the same nests, etc. Report of same is sent to the headquarters of this Association at Boston.

We insist on the fact that the present report, compared with the one above mentioned, is entirely satisfactory. This proves that the warden put there by Mr. W. R. Brown for two years was the best possible way of affording protection to these colonies of valuable birds. The warden seems to be attentive to his duty, for as soon as the party landed on the Razades, he came out to see who they were and what was the object of their visit.

It is to be hoped that the Razades will be protected again for sufficient time to ensure that the good result obtained since two years may be durable.

IN MEMORIAM

Henry Albert Pattinson Smith

Born, 1864 Died, 1923

In the death of Henry Albert Pattinson Smith, Sheriff of Digby County, Nova Scotia, which took place at St. John, N.B., on the 29th April, 1923, the cause of game conservation lost a valuable friend and devotee. An ardent sportsman and hunter and an expert angler, he was for many years identified with the study of our wild life, and during his career was responsible for many interesting observations, many of them being of scientific value.

Mr. Smith was born in Halifax, April 24th, 1864, the son of an English physician, Dr. Peleg Wiswall Smith. He was appointed sheriff of Digby County in 1897 and in 1919 became in addition a Deputy Warden with authority in the Maritime Provinces under the Migratory Birds Convention Act. In the interests of this work he was visiting New Brunswick when he was stricken with what proved to be his last illness.

He was a member of the Ottawa Field-Naturalists' Club and the American Society of Mammalogists and was an Associate Member of the American Ornithologists' Union. He spent the summer of 1920 in the Canadian Labrador, where he did splendid work in the protection of the breeding colonies of sea birds which are found on those shores.

His articles dealing with Natural History subjects were of especial interest, portraying as they did many of the hitherto little known habits of birds and mammals. Many of these articles were of unique value, reflecting conditions of wild life in Nova Scotia which no longer exist, and were based upon his observations during many years in the open.

He played a prominent part in the introducton of the white-tailed deer into Nova Scotia, assisting personally in rounding up a considerable number in New Brunswick in the deep snows of winter, for importation to this Province in the first instance.

In the late nineties Mr. Smith rendered valuable assistance to Mr. Outram Bangs, now associated with the Museum of Comparative Zoology at Harvard University, in the accumulation of a collection of mammals of Nova Scotia, and on October 15th, 1898, he secured for this scientist three specimens of the caribou believed to be now extirpated in this Province except in Cape Breton.

He contributed articles to *The Canadian Field-Naturalist*, to *Forest and Stream*, and to other sporting papers. The Willet colonies of Nova Scotia interested him very greatly.

It was an ardent protectionist, particularly at a time when adequate laws for the protection of our

game resources were still in the making, that his native province is most indebted to him. He held broad and humanitarian views on the subject and his intimate knowledge of men made it possible for him to exert a certain restraining influence over the more lawless element among the gunners. It is recalled, for instance, that, owing to his personal efforts, the custom of slaughtering seafowl from "tubs" or "sink-boxes", which was prevalent in certain areas along the coast, was practically abolished. It is also recalled that some ten or fifteen years ago he voluntarily abandoned his favorite sport of Woodcock shooting because he was convinced, from his own careful observations, that this bird was rapidly decreasing in numbers. These and many similar examples of true sportsmanship and altruism naturally endeared him to those with whom he came into contact and his loss is in many respects a great one.—R. W. T.

ON THE CROWN MARKINGS OF JUVENILE HAIRY AND DOWNY WOODPECKERS

By L. L. SNYDER

THE crown markings of juvenile Hairy and Downy Woodpeckers have not received the attention that they should receive. Very few of the more elementary manuals mention the occurrence of reddish and white crown markings on these species (and other members of the genus) while some of the more technical works on descriptive ornithology differ in their statements. Ridgway, in his *Birds of North and Middle America** describes the immatures of the Hairy Woodpecker (*Dryobates villosus villosus*) as follows: "*Young male.*—Similar to the adult male, but without any red nuchal patch, the crown, however, streaked or spotted with red (usually more or less pale—sometimes pale yellowish or pinkish) the reddish or yellowish tips to the feathers often preceded by a small spot or streak of white;. . .*Young female.*—Similar to the young male, but without any reddish or yellowish on crown, which, however, is sometimes minutely streaked or spotted with whitish."

Concerning the Downy Woodpecker (*Dryobates pubescens pubescens*), Ridgway† describes the young male as "without the red nuchal band, the occiput and more or less of crown, however, with feathers tipped with red (usually more or less pale), the crown often dotted with white;—*Young female.*—Similar to the young male, but without any red on head."

These descriptions imply that reddish or yellowish crown markings are constant on immature males but do not occur on immature females which, however, may or may not be marked with whitish.

Baird, in his work included in the *United States Pacific Railway Survey Report*‡ says, "It may be assumed as a general principle, in reference to the black spotted Woodpeckers of North America belonging to the restricted genus *Picus* [*Dryobates*] that whenever the crown is spotted with red or yellow, either partly or entirely, the specimen is immature and may probably be of either sex. . . ."

The writer has recently had an opportunity of examining seventeen skins of immature specimens of each of the two species. Although this number is hardly sufficient to justify one in forming any final conclusion, it seems that the percentage of marking occurrence in these skins is a fair indication of what one would find in a larger series. It is notable that immatures are not numerous in collections and are often difficult to obtain although both species are usually considered regular and common breeding birds throughout their summer range.

The following collections were examined in getting data on the subject of juvenile crown markings; those at the University of Minnesota at Minneapolis and at the Field Museum of Natural History at Chicago, and those of J. H. Fleming, the Provincial Museum, and the Royal Ontario Museum of Zoology at Toronto. The following table indicates the number and sex of each species examined and the character of the markings on the crown. The two species, *villosus* and *pubescens*, are listed separately but the various forms of each are listed together since they, presumably, exhibit the same variation. Only specimens sexed by known collectors are considered.

	Males with Red, Pinkish or Yellowish on Crown.	*Males with White Markings only on Black Crown.*	*Females with Red, Pinkish or Yellowish on Crown.*	*Females with White Markings only on Black Crown.*	*Females with Entire Crown Black.*
Dryobates villosus	9	1(*a*)	1(*b*)	3	3
Percentage	*90*	*10*	Approx. *14*	Approx. *43*	Approx. *43*
Dryobates pubescens	10	0	1(*c*)	3	3
Percentage	*100*	*0*	Approx. *14*	Approx. *43*	Approx. *43*

*a*No. 48451, Field Museum of Natural History; taken by W. E. Snyder on June 1st, 1903, at Beaver Dam, Wisconsin. (White markings are confined to forehead.)

*b*No. 51184, Field Museum of Natural History; taken by H. S. Swarth on May 28th, 1906, at Joliet, Illinois. (Three feathers on crown show a trace of red near their shafts.)

*c*No. 48616, Field Museum of Natural History; taken by W. E. Snyder on Aug. 10th, 1904, at Beaver Dam, Wisconsin. (Has whitish spots on crown faintly tipped with dull reddish.)

It is difficult to say whether the percentages indicated in the above table give the approximately normal variation in crown markings of the two species or merely suggest the percentage of error in sexing juveniles. Accepting the former, it is

*Part VI.; pages 203, 204.
†Part VI.; page 230.
‡Vol. IX; Pt. II; page 86.

not surprising when one considers the frequency of irregularities and variations of color, its hue and distribution, occurring in the Woodpecker family. As a group they are supposedly subject to reversion, mutation, hybridization—variations which make them interesting.

With specimens of either of the two species in hand it is not difficult to detect juvenility aside from the crown markings. The skull is thin and soft and the feathers of the underparts have a decided woolly texture. The upper and lower lines of the bill do not run as nearly parallel as in the adult, the culmen having a tendency to arch, curving down to the tip, which is decidedly acute from nonuse. Sexing is, however, the important procedure and is usually difficult in young birds, even when the organs have not been disturbed by shot or affected by decomposition. Questionable specimens should be marked as such and then are of greater value.

Two male specimens of *Dryobates pubescens* examined are of interest in that they exhibit the transition stage between the immature and the adult, some reddish feathers on the crown and the red nuchal patch being present. It is evident that the juvenile crown markings are lost during the post-juvenile moult. This may be considered as one reason why the character is not more frequently seen in the field. Other causes, such as the fact that these birds are usually seen at an angle that conceals the crown, and the fact that the markings are at no time decidedly conspicuous, have helped to conceal these interesting marks from many field observers.

NOTES AND OBSERVATIONS

It is earnestly requested that payments for 1923 subscriptions that have not yet been received may be sent to the Treasurer at once.

THE ORANGE-CROWNED WARBLER (*Vermivora celata celata*) IN THE PROVINCE OF QUEBEC.—So far as I am aware, there are only four authentic records of the capture of this Warbler in the Province of Quebec, and as two of them date back to 1890, and as there appears to have been always some ambiguity concerning one of them, it occurred to the writer to try to clear up the matter and to locate the present whereabouts of the birds in question; a task which has only just been accomplished.

Taking the cases in chronological order, the first one to be noticed is that of a bird said to have been obtained near Quebec in 1890, and concerning which the ambiguity exists, for in Macoun's *Catalogue of Canadian Birds*, 1909, p. 615, we find the following: "One example taken at Beauport near Quebec, in 1890. (Dionne.)" Previous to this, in 1906, in *Les Oiseaux de la Province de Quebec*, p. 356, the author, Mr. C. E. Dionne, records the facts as follows: "Je n'ai encore rencontré qu'un seul spécimen de cette oiseau, le 13 mai 1890, dans le bois De Blois, au nord de Québec." From this we gather that the bird was not actually obtained but was only observed by Mr. Dionne, thus differing from the account in Macoun's *Catalogue*. In Ridgway's *Birds of North and Middle America*, Vol. 2, 1902, no mention is made of this bird, although that of Wintle (the next to come under our notice) is recorded. By writing to Mr. Dionne the matter has been cleared up once and for all, for in his reply to me, dated October 27, 1922, he says, "I ought to tell you, that it was not I, who killed the Orange-crowned Warbler, but a young man who brought it to me the same day, and who told me that he had killed it in a small wood called the bois de Blois, near the city. It (♀) was fresh and I had it mounted for my personal museum. I identified it from two specimens in the museum of the Laval University. Unfortunately a few years ago, a large part of my museum was destroyed by a fire, and this warbler perished with the others."

The next case to come under our notice is that of the bird obtained by the late Mr. E. D. Wintle, on the spur of Mount Royal, Montreal, on May 21, 1890, as recorded in his *The Birds of Montreal*, 1896, p. 112, wherein the author says the skin was then in his collection. Since the death of Mr. Wintle on July 29, 1917, I have endeavoured from time to time to trace the whereabouts of this skin, but without success until a few days ago, when I heard from Mr. Harrison F. Lewis that he had luckily found it in Montreal, on November 6 of the present year, 1923. The following is an abstract from his letter to me of November 14, "It is in L'Institution des Sourds-Muets, 3600 St. Lawrence Boulevard, Montreal, and is at present kept as a mounted bird. Attached to it is a faded label which reads, 'Orange-crowned Warbler, *Helminthophila celata* ♂, shot by E. D. W. on Cote St. Antoine Mountain, May 21/90.' I was informed by the Curator of the Museum of the Institution that he had received this bird as a skin and had afterwards mounted it himself. It is fortunate that he had the good sense to leave the label with the original data attached."

Luckily the third case to come under our notice presents no difficulties whatever, as the bird was obtained by myself at Hatley on September 29, 1919, and at that date was the only known "Fall"

record for the Province. It was presented in the flesh to the Victoria Memorial Museum at Ottawa, where it now rests, its catalogue number being No. 14,404. It was unfortunately too badly shot to be sexed, but apparently from its plumage it is a male. I was fortunate in locating another bird the day following the capture of the one mentioned above, and was able to study its habits, which will be found recorded in my *Further Notes and Observations on the Birds of Hatley*, *'Auk'*, Vol. XXXVIII, 1921, No. 1, pp. 58-59. In this same paper references will also be found to the Orange-crowned Warbler's rareness in the New England States, as well as in Eastern Canada, the date of the capture of Wintle's bird by a printer's error, there appearing as May 31, instead of May 21, 1890.

The fourth case, like the last mentioned, presents no difficulties whatever, for the bird was found dead on board the C.G.S. *Arctic*, off Point des Monts, on the north shore of the mouth of the St. Lawrence, and was collected by Mr. Dewey Soper, and is now in the Victoria Memorial Museum at Ottawa, but as it has not yet been catalogued, it has no museum number. It (sex?) probably came aboard the ship during a high wind on October 1, 1923, between Mingan and Anticosti. I am indebted to Mr. P. A. Taverner for the particulars of this bird. It is gratifying to have at last cleared up any doubts regarding the first two birds, before it was too late, as now there need be no misgivings on the part of those who come after us concerning these rare records.—HENRY MOUSLEY.

Cardinalis cardinalis cardinalis, THE CARDINAL, TAKEN NEAR SAULT STE. MARIE, ONT.—A male Cardinal was shot in Mud Creek Swamp near the Goulais Bay-Bellevue Rd., about 20 miles N.W. of Sault Ste. Marie, Ont., on 7th November, 1923. The occurrence of this species in this district is believed to be unprecedented.—W. H. A. PREECE.

EDITOR'S NOTE.—The nearest occurrence of the species to this that we have records of is in Southern Michigan north of Lake St. Clair and Grand Rapids and near the Lake Erie shore in Southern Ontario.—P. A. T.

NOTES ON SOME INTERESTING SPECIES.—HUDSONIAN CURLEW (*N. hudsonicus*).—This species is no doubt quite uncommon in Manitoba. The only recent record I know of is that of a pair I saw at Gimli, Lake Winnipeg, on May 21, 1921. A specimen (♀) was collected.

BUFF-BREASTED SANDPIPER (*T. subruficollis.*)—An immature male was taken on August 13th, 1923, near Winnipeg. It was feeding on the edge of a pond in company with Baird's and Semipalmated Sandpipers.

RICHARDSON'S MERLIN (*F. c. richardsoni.*)—A male was taken near Tofield, Alta., on May 26th, 1923.

NORTHERN PARULA WARBLER (*C. a. pusilla.*)—The first Manitoban record for this species was that of an immature male taken in Winnipeg in September, 1917, by J. J. Golden. Last summer it was found fairly numerous in an area of mixed poplar and spruce, and swampy land near Indian Bay, Shoal Lake, about 100 miles east of Winnipeg. This was on July 3rd, so no doubt they were nesting at this point, although no nests were actually found. Several specimens were collected.

TOWNSEND'S SOLITAIRE (*M. townsendi.*)—An immature male was taken on October 20th, 1923, about 23 miles north-west of Winnipeg. I collected an adult male on May 9th, 1922, at Lake Johnston, Sask.—C. G. HARROLD.

RED-WINGED BLACKBIRD WINTERING AT OAK LAKE, MANITOBA.—In the fall of 1922 a flock of seven male Red-winged Blackbirds frequented a patch of standing fodder corn near our building at Oak Lake, Manitoba, where they fed on corn on the cob. One night two of them disappeared. Then I took one for a specimen and not long afterward another one disappeared. The birds used to roost in the reeds along the edge of a large slough, where the snow often drifted in very badly, and I think the birds were drifted over in the night. Two of them remained around the stableyard until about the end of January, 1923, after which time only one was seen. This survivor, a young male, with very pale red on the wings and with brown spots among the black of its plumage, formed the habit, during the stormy weather of February, of going into the granary with the Sparrows for food and shelter, but it always spent the night among the reeds. I put oats and half-ripe fodder corn on a little shelf for it and found that it seemed to like such food. This bird was here every day all through the winter, and on March 4, 1923, another Red-winged Blackbird was seen with it in the yard.

Late in the afternoon of that day the two Blackbirds flew away westward toward the lake, and I watched them to see where they went. The stranger flew away first, with our Blackbird following about a hundred yards behind. I watched them until they were just specks in the sky, when the bird behind turned back and returned to our stableyard. I suppose he thought the place where he had found food all winter was better than the place where the other bird was going. A few days later I visited a farmer who

lives on an island, on which are rather heavy oak woods, about two miles west of us. When I asked him if he had seen a Blackbird around his farm during the winter he told me that one had spent the winter there and had fed on the grain where the cattle had been fed. I am sorry that I failed to band either of these Blackbirds. The one which spent the winter with us was still present in April. The weather during the winter of 1922-23 was very severe.—HERMAN BATTERSBY.

REPORT OF THE WILD LIFE PHOTOGRAPHIC EXHIBITIONS COMMITTEE.—At the December 28, 1922, meeting of the Council of the Ottawa Field-Naturalists' Club, a proposal was made that the Club and affiliated Societies assemble a collection of Wild Life (fauna and flora) photographs, to be exhibited in various centers under the auspices of natural history societies and other similar bodies.

A committee was appointed and the first exhibition, consisting of approximately three hundred photographs, mostly enlargements contributed by thirty-five photographers, was held in the Victoria Memorial Museum, Ottawa, during the first week in March, 1923, under the distinguished patronage of Their Excellencies the Governor-General and the Lady Byng. Admittedly the time in which to prepare photographs was somewhat limited, but it was thought advisable to have the exhibitions take place during the spring months. Work which could not be made ready for this year's showing will be so much good material for future exhibitions.

Of the photographs submitted, bird studies predominated, though practically all branches of natural history were portrayed. Plant studies included those of trees, flowers and fungi, and the animal kingdom was represented by mammals, birds, fishes, reptiles, amphibians and insects.

It is hoped that by promoting such displays of photographic art, greater stimulus will be given to hunting with the camera rather than with the gun, and that the conservation of plant forms will be encouraged. In thickly populated districts the spectacular and the rare plants such as flowering dogwood, bittersweet, lady slipper, and arbutus have been torn down and uprooted to the verge of extermination. In Canada we hear a great deal about the conservation of trees but very little regarding the preservation of wild flowers, though in the United States, Greenland, and most European countries, societies undertaking their preservation have been established.

While exhibited in Ottawa the collection of Wild Life photographs was viewed by His Excellency the Governor-General and the Lady Byng, and was well patronized by the public.

In Victoria, B.C., under the auspices of the Natural History Society of British Columbia, the photographs were exhibited in the Provincial Museum by permission of the Provincial Secretary. The Lieutenant-Governor attended the exhibition, and the public school teachers were instructed to bring their classes when convenient. The total attendance amounted to over five thousand persons.

During the first week in April the collection was shown in Red Deer, Alberta, under the auspices of the Alberta Natural History Society.

The Natural History Society of Manitoba exhibited the collection in the Art Gallery at the Board of Trade Building, where it was visited by a large number of people.

In Toronto the collection was displayed in the Royal Ontario Museum of Zoology, where it attracted considerable attention.

Under the auspices of the Hamilton Bird Protection Society, the photographs were shown in the Public Library, Hamilton, where they attracted great attention, being visited by hundreds of people.

In Montreal the collection was exhibited by the Quebec Society for the Protection of Birds, in the Art Gallery, and was greatly appreciated.

The Saskatchewan Department of Agriculture requested the use of the Wild Life photographs for display at the Saskatoon and Regina Summer Fairs. Some of the photographs were also shown at the Prince Albert Fair.

In November the pictures were exhibited in Edmonton, where they were highly commended by the public and the press.

The collection will next be shown in Quebec under the auspices of the Provancher Society of Natural History of Canada.—CLYDE L. PATCH, *Chairman, Wild Life Photographic Exhibitions Committee.*

By arrangement with the author the concluding instalment of *The Birds of Ottawa, 1923*, has been held over for the issue for January, 1924, in which it will appear.—EDITOR.

We are glad to announce that, through the interest and generosity of a number of its friends, *The Canadian Field-Naturalist* will contain numerous attractive illustrations in 1924. This advance begins in the present number, in which the illustrations appear through the assistance of Mr. W. J. Brown. It is hoped and expected that this policy can be continued in all the issues of the coming year. Please tell your friends and urge them to subscribe now to *The Canadian Field-Naturalist* for 1924.—EDITOR.

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